

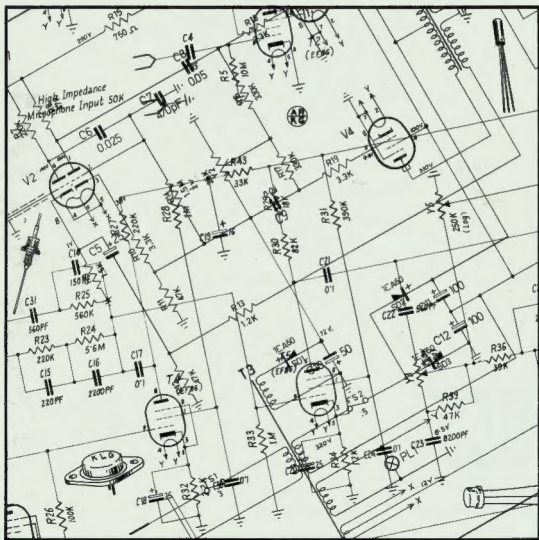
# amateur radio

Vol. 36, No. 11  
NOVEMBER 1968

Registered at G.P.O. Melbourne, for  
transmission by post as a periodical

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NOVEMBER 1968

Registered at G.P.O., Melbourne, for transmission by post as a periodical





## 125 Volt Rating:

[illegible]

20,000 ohms per volt d.c., 8,000 ohms per volt a.c.

**Specifications:**

D.C. volts: 0-0.3, 1, 10, 50, 250, 500, 1,000, 5,000.  
A.C. volts: 0-0.3, 10, 50, 250, 1,000.  
D.C. resistance: 0-30  $\Omega$ /A; 1, 50, 500 mA; 10 A.  
Current: 0-5, 500K ohms; 5, 50 megohms.  
Dials: Minus 23 to plus 22 db., plus 20 to plus 30 db.  
Capacitance: 250 pF, to 0.02  $\mu$ F.  
Inductance: 0-5000 H.  
Load current: 0-0.06, 0.6, 60 mA.  
Built-in recharge batteries: 22.5V. (BL-015) x 1, 1.5V.  
Size and weight: 6 x 4-1/2 x 2 in. 650 g.  
Meter movement full. sensitivity: 30  $\mu$ A., F.S.D.  
**Price \$19.75, Cost 25c.**

**Price only**  
**\$5.50**  
Stand to suit  
\$2.50 extra.

(Parachute type), 6 volt. Suitable for Burglar Alarms, etc., complete with trip rope, etc. Price \$1.25, post 50c.

## Cracked Carbon 5%, Preferred Range:

10, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82, 100,  
120, 150, 180, 220, 270, 330, 390, 470, 560, 680  
220, 1K, 1.2K, 1.5K, 1.8K, 2.2K, 2.7K, 3.3K, 3.9K  
4.7K, 5.6K, 6.8K, 8.2K, 10K, 12K, 15K, 18K, 22K  
27K, 33K, 39K, 47K, 56K, 68K, 82K, 100K, 120K  
150K, 180K, 220K, 270K, 330K, 390K, 470K, 560K  
680K, 820K, 1M, 2.2M, 3.3M, 3.9M, 4.7M, 5.6M  
6.8M, 8.2M, 10M

1/2 watt: 8c ea. or \$5.00 per 100  
1 watt: 10c ea. or \$7.00 per 100

Large rubber earpiece, full audible frequency,  
50-1500 cycles. Price \$8.00.

20,000 ohms per volt d.c., 10,000 ohms per volt a.c.

Specifications:  
D.C. volts: 0-5, 25,  
50, 250, 500, 2500  
A.C. volts: 0-10, 50,  
100, 500, 1000  
D.C. current:  
uA: 25, 250 mA  
Resistance: 0-60,000  
ohms: 0-6 meg.  
Capacity: 0.01-9.3  
mF (at A.C. 50V.)  
0.0001-0.01 uF (at  
A.C. 250V.)  
Decibel: Minus 20  
db., plus 22 db.  
Output range: 0-10,  
50, 100, 500, 1000  
Battery used: UM3  
1.5V. 1-piece



|                               |           |         |         |     |
|-------------------------------|-----------|---------|---------|-----|
| Phillips Trimmers             | 10-60 pF  | 22c     | 3-30 pF | 23c |
| N2 Neon                       | 90v.      | 30c     | 240v.   | 50c |
| Bezel Lamp Holders and Globe  | red/white | 45c     |         |     |
| Banana Plugs and Sockets      |           | 12c ea. |         |     |
| FT243 Crystal Sockets         |           | 29c ea. |         |     |
| Don Miniature Crystal Sockets |           | 29c ea. |         |     |
| HC18 Crystal Sockets          |           | 40c ea. |         |     |
| Transistor Plugs and Sockets  | 3.3m.     | 35c p.  |         |     |

[illegible]

## RECORDING TAPES

DOI: 10.1002/for

|          |                |       |       |       |       |       |        |
|----------|----------------|-------|-------|-------|-------|-------|--------|
| 150 Feet | — Acetate Base | 5-75  | 10-00 | 10-00 | 10-00 | 10-00 | 55c    |
| 225 Feet | — Acetate Base | 10-00 | 10-00 | 10-00 | 10-00 | 10-00 | 75c    |
| 300 Feet | — Mylar Base   | 10-00 | 10-00 | 10-00 | 10-00 | 10-00 | \$1.15 |

|                       |        |
|-----------------------|--------|
| 800 Feet — Muler Base | \$4.95 |
|-----------------------|--------|

## 4 INCH REELS

## 5 INCH REELS

|                                |        |        |        |        |               |
|--------------------------------|--------|--------|--------|--------|---------------|
| <b>900 Feet — Acetate Base</b> | \$2.00 | \$2.00 | \$2.00 | \$2.00 | <b>\$8.00</b> |
|--------------------------------|--------|--------|--------|--------|---------------|

|                        |    |      |       |       |       |       |        |
|------------------------|----|------|-------|-------|-------|-------|--------|
| 1250 Feet — Mylar Base | 14 | 2000 | 10.29 | 10000 | 1.000 | 1.000 | \$3.80 |
| 1000 Feet — Mylar Base |    |      |       |       |       |       | \$5.75 |

## 5 1/4 INCH REELS

|                          |      |      |      |      |      |        |
|--------------------------|------|------|------|------|------|--------|
| 1200 Feet — Acetate Base | 1000 | 1000 | 1000 | 1000 | 1000 | \$3.49 |
| 1200 Feet — Mylar Base   |      |      |      |      |      | \$3.75 |

### 3 INCH BEER

|                          |      |      |      |      |      |        |
|--------------------------|------|------|------|------|------|--------|
| 1200 Feet — Acetate Base | 1971 | 1972 | 1973 | 1974 | 1975 | \$3.00 |
| 1200 Feet — Mylar Base   |      |      |      |      |      | \$2.95 |

|                        |    |      |      |      |      |      |        |
|------------------------|----|------|------|------|------|------|--------|
| 1800 Feet — Mylar Case | .. | 1993 | 1998 | 2002 | 2007 | 2009 | \$5.00 |
|------------------------|----|------|------|------|------|------|--------|

**300 Feet — Tyler Basse**    11   1981   1982   1983   1984   1985   **\$9.75**

## 3 Inch 28c 5 Inch 40c

## 4 inch 400 7 inch 500

## VOLTAGE DOUBLER TYPES

## VOLTAGE DOUBLER TYPE

| Type, No. | H.T. Sec. Volts   | Max. D.C. mA | Heater Windings A | Price   |
|-----------|-------------------|--------------|-------------------|---------|
| PT2062    | taps 105 125      | 80           | 5.3CT 2.25        | \$10.80 |
| PT2063    | taps 105 125      | 80           | 5.3CT 2.25        | \$12.40 |
| PT2067    | taps 125 150      | 100          | 5.3CT 4           | \$13.00 |
| PT2064    | taps 125 150      | 125          | 5.3CT 2.25        | \$12.30 |
| PT2065    | taps 125 150      | 150          | 5.3CT 3           | \$13.60 |
| PT5324    | taps 105 125      | 150          | 5.3CT 3           | \$12.20 |
| PT2066    | taps 114, 104 150 | 190          | 5.3CT 3           | \$13.70 |
| PT2068    | taps 105 150      | 208          | 5.3CT 3           | \$23.00 |
| PT1985    | taps 115, 175 300 | 300          | 12.6CT 3          | \$29.00 |

| Type No. | H. Sec. Volts | Max. D.C. mA. | Rectifier Heater V. A. | Other Heaters V. A. | Price  |
|----------|---------------|---------------|------------------------|---------------------|--------|
| PT1982   | 150-0-150     | 30            |                        | 5.3 1.7             | \$5.50 |
| PT1931   | 180-0-180     | 40            |                        | 6.3 2               | \$6.70 |
| PT1040   | 235-0-235     | 40            | 6.3 2<br>tap 5 2       | 6.3 2               | \$8.50 |
| PT1983   | 225-0-225     | 50            |                        | 6.3 2               | \$3.75 |
| PT1941   | 235-0-235     | 50            | 6.3 2<br>tap 5 2       | 6.3 2               | \$9.00 |

**Specifications.**—Standing Wave Ratio: 1:1 to 1:10. Accuracies: Plus or minus 3 per cent. scale length. Impedance: 52 ohms and 75 ohms. Meter: 0-100 DC microamperes. **Price \$19 inc. tax.**

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# amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA FOUNDED 1910



NOVEMBER 1968

Vol. 36, No. 11

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## W.I.A. OFFICIAL BROADCASTS

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VK2WJ, Sundays, at 1100 hours E.A.S.T.  
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# SIDEBAND ELECTRONICS ENGINEERING

In my last month's (October) advertisement I have included a plug for the ACITRON line of locally constructed equipment. My intention was to show my interest in all promising developments, naturally with also a little commercial consideration included.

A very ambitious programme and it will take time to realise. As soon as more news on the ACITRON line is available you can expect to hear more from me.

Meanwhile I continue to look for diversification, adding more YAESU-MUSEN gear to my stock. This stock will soon include half a dozen different brands, some 15 or more s.s.b. sets and over 25,000 dollars worth of gear! Yes, a long way from a modest start five years ago.

Mobile activity will soon increase and I am ready for it with the WEBSTER Bandspanners and Mark helical whips, the latter are 6 ft. long radiators for 40 metres and a genuine 10-15-20 metre triband one, no retuning or adjustments required. Also the matter of d.c. supplies will soon be solved with a reasonably priced Australian made unit, adaptable to Drakes, Swans and Galaxies. Target cost price no more than \$100.

For home use I still recommend the MOSLEY and HQ-GAIN Junior and the HY-GAIN Master triband 10-15-20 m. Yagis. Next best is the all-band trapped NEWTRONICS Hustler vertical 4-BTV, which needs no guy ropes under average wind exposure. The German W-3-DZZ all-band dipole has become so popular that I had to rush a follow-up order to DL-land, but they will soon be in stock again.

Well, hereunder is my expanding list of goodies. For those who don't know me, yet, I sell brand-new imported gear for less than anybody else in Australia, all equipment is fully guaranteed and where necessary checked and tested before shipment. Prices are net, cash, Springwood, N.S.W. As to trade-ins, sorry no a.m. gear or antiquated receivers or disposal items. My very limited profit margin of 10 to 15 per cent. gross does not allow me to be generous on trade ins. 73, Arie Bles.

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**Grab my last GONSET 2 metre Sidewinder to be ready for the summer 2 metre DX, \$350, including 115v. a.c. supply. Likewise be ready for the 6 metre DX this season with the Swan SW250.**

**HEATH HA-15 Linears, a few kits left, no more imports after that, \$150.**

**HY-GAIN TH6DXX, six element 10-15-20 metre beam, with BN-86 Balun, still only \$200.**

**HY-GAIN TH3JR triband beam, \$105.**

**MOSLEY TA33JR, \$98.**

**HAM-M CDR heavy duty Rotator, with 230v. indicator-control unit, \$180.**

**CDR AR-22 light Rotator, for junior beams, with control-indicator box, \$60.**

**NEWTRONICS Hustler 4-BTV, 10-40 mx vertical, \$55. With 80 mx top coil, \$65.**

**WEBSTER Bandspanner, 10-80 mx centre-loaded Mobile Whip with mountings and spring, still only \$55.**

**MARK 10-15-20 mx triband Helical Whip, sorry a bit dearer now, \$27.50; Mark 40 mx 6 ft. Helical Whip, \$16.**

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**CETRON 572B/160TL 150w. Triodes for Linears, \$18.**

**Used spotless COLLINS 75S-3A Receiver, with Collins speaker, c.w. filter, notch filter, \$500.**

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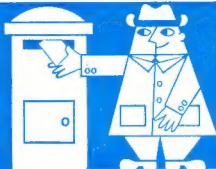
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## FEDERAL COMMENT

JOHN B. BATTRICK, VK3OR, Federal President, W.I.A.

In the I.A.R.U. Region I. Bulletin recently received was an editorial by John Clarricoats, O.B.E., G6CL. John, you will remember, was, while Secretary, the driving force behind the R.S.G.B. He now enjoys his retirement (?) as Secretary to I.A.R.U. Region I. Division. He headed his editorial:—"A Dream Comes True," and went on to say:

"Way back in 1950 when the idea of establishing an I.A.R.U. Region I. Division was first discussed at the Silver Jubilee meeting of the I.A.R.U. in Paris, the present chairman (SM5ZD) and the present Secretary (G6CL) of the Division talked over the possibility of adopting a Regional system of running the Union, but as the years went by the difficulties appeared to grow larger until during the winter of 1964, thanks to Mr. Herbert Hoover, Jr., first steps were taken to inaugurate an I.A.R.U. Region 2 Division, although for some reason it has never assumed that title as of right preferring to be known, formally, as the Inter-American Union of Radio Amateurs—Region 2 Division.

"Last year Member Societies in Region 2 participated in a highly successful conference in Caracas, Venezuela, and as recently as Whitsun of this year the Executive of the Region gathered in Monterrey, Mexico, to discuss the problems facing Amateur Radio in the Western Hemisphere.

"And now comes the good news that Societies in Region III, notwithstanding the vast distances involved, have established an I.A.R.U. Region III. Division. . . . A dream has at last come true, and I.A.R.U. has indeed become a live international organisation and not just a name."

In addition, John Huntoon, W1LVQ, Secretary to the A.R.R.L. and I.A.R.U. Hdq., reports on the matter as follows in issue No. 76 of the I.A.R.U. Calendar, June 1968:

"At mid-year 1968 the major item of interest to organised Amateur Radio was the successful establishment of a Region III. Division of I.A.R.U. This was completed on a world-wide basis the regional system whereunder Societies in a certain area are able to cope more effectively with problems and projects specialised in that area. It was perhaps the long-term objective of European Amateurs, led by the Radio Society of Great Britain, in efforts leading to the establishment of the Region I. Division, back in 1950.

"The Wireless Institute of Australia felt that the occasion of its federal convention in April might be a suitable basis for convening representatives of Societies in the Region, and through correspondence was encouraged to issue formal invitations to an inaugural congress. Japan, Philippines and New Zealand attended, along with Australian delegates; Ceylon, India, South Korea, Laos, Thailand and Hong Kong indicated support for the meeting but were unable to send representatives. Our President, Robert W. Denniston, W0DX, who was a leader also in the establishment of Region II, attended from the I.A.R.U. Hdq. and was requested to chair the sessions. . . .

"President Denniston extends his sincere congratulations to many Amateurs who had a part in the establishment of the Region III. Division, expresses his deep satisfaction with the spirit of dedication and co-operation which characterised the meetings, and offers his best wishes for continued strengthening of Amateur bonds in Region III."

As was reported earlier in "A.R." the form of the executive body of Region III. is somewhat different from that in Region I. A Directorate of five, representing the countries present at the Sydney conference has been appointed to act until the next Plenary scheduled for Tokyo in 1971. These Directors of Region III. Division I.A.R.U. are as follows:

W0DX, Bob Denniston, President I.A.R.U. and A.R.R.L.

VK3OR, John Battrick, Federal President W.I.A.

JA1BK, Kyoshi Misoguchi, Overseas Director J.A.R.L.

ZL3AZ, Tom Clarkson, Overseas Liaison Officer N.Z.A.R.T.

DUIEA, Emilio Asistores, Wireless Institute of the Philippines.

This last Society—W.I.P.—is a new one! At Sydney Emilio represented P.A.R.A.—Philippines Amateur Radio Association, and one of the documents he collected was a copy of a Divisional Constitution of W.I.A. On return to his country, P.A.R.A. and P.A.R.L. (the Philippines Amateur Radio League) amalgamated to form the one representative body—W.I.P., based on W.I.A. lines.

It may seem strange that W0DX is a Director of the Region III. Division, however this was the wish of delegates in Sydney—he holds his Directorship by virtue of his office of President of I.A.R.U., and the N.Z.A.R.T. in particular were very strongly of the view that any Regional association was to "assist the officers of I.A.R.U. headquarters." It was not envisaged that the Societies in Region III. would "go it alone" in a manner separate and perhaps divergent from I.A.R.U. headquarters. The inclusion of the President for the time being of the I.A.R.U. as a Director is our practical expression of this wish.

Since the conference in Sydney, a Secretariat was formed comprising members of the W.I.A. Federal Executive, viz.:

Chairman: VK3OR (W.I.A. Director).

Secretary-General: VK3IZ (Federal Secretary W.I.A.).

Members:

VK3KI (Federal Vice-President W.I.A.).

VK3QV (Federal Activities Officer W.I.A.).

VK3ADW (Federal Intruder Watch Co-ord. W.I.A.).

The Secretariat is also assisted by VK3VX, George Plither, the I.T.U. Liaison Officer of W.I.A. We felt it was wise to keep George's office separate from the Regional Secretariat for the time being, so that the W.I.A. I.T.U. Fund can also be seen as separate from I.A.R.U. Region III. Funds. The I.T.U. Fund is in a separate bank account, set aside for a particular purpose, and cannot be used for any other purpose. It is in effect, over and above the organisation of Region III. Division and may be looked on as a W.I.A. second string. It amounts at the moment to over \$6,000.

As far as funds of the Region III. Division are concerned, J.A.R.L. has agreed to contribute 400,000 Yen—approximately \$1,200 per annum and W.I.A. agreed to contribute \$600 per annum. (Thus \$600 will be recovered from W.I.A. members at the rate of 20 cents p.a. per member.)

This matter of funds and finance brings up a quite important point. We as a Secretariat are charged with administering the Division—in terms of policy determined triennially at Plenary



meetings, and in between these Plenary meetings in terms of determination of the Directorate. We are also charged with handling funds—the remission of funds from Japan is subject to their Central Bank receiving a copy of a constitution and rules. Our Reserve Bank will also require such a set of rules—as may all banks in overseas centres before funds can be moved around the Region.

Michael Owen, VK3WI and the members of the Secretariat have drawn up an interim constitution for the I.A.R.U. Region III. Division. This runs to over 50 clauses and has been circulated to the five Societies who have appointed Directors. The preparation of this interim constitution for the Region III. Division, and the ensuing correspondence between countries has been the major activity since Sydney. Because we on the Secretariat are not prepared, or even able to act unless we are protected by proper rules, we have asked countries to adopt a somewhat unusual approach. We want them to adopt the interim constitution as it stands, and once it is adopted to then amend some of its clauses to improve it. Already certain valid and relevant objections have been raised, which can be the basis for amendment presently, however to get the Division "on the road" we must have some rules—however inappropriate they may seem in certain respects. A position of stalemate may be the outcome if we have to agree to rules in all details before we can act, because we certainly can't act without some sort of constitution!

Why the rush? Already I believe it is felt that W.I.A. was somewhat precipitous in calling the conference earlier this year, and with hindsight it may have been easier to have resolved the constitutional matters in Sydney—even at the expense of a longer conference. I feel that we have two years to do something in the Region to prepare for the next I.T.U. Conference, scheduled for late 1970 or early 1971. Perhaps our 1971 Plenary will have to be held earlier and prior to the I.T.U. Conference! Time may be running out—I hope we don't spend too much of it on polishing up a set of rules, but get down quickly to more active efforts. Emilio DUEA, W.I.P. Director, does travel the Region in his capacity as Deputy Director of Civil Aviation in the Philippines, and could well make contact with administrations in our Region. I.A.R.U. headquarters has introduced D.A.R.E. (Develop Amateur Radio Everywhere) programmes into some countries of the Region. Perhaps the first way we could assist the officers of I.A.R.U. headquarters is to evaluate

the efficacy of this programme, and to assist in introducing this elsewhere in the Region.

J.A.R.L. has ratified the interim constitution and at the same time suggested one amendment; W.I.A. has also ratified the interim constitution, and we await ratification from I.A.R.U. hdq., N.Z.-A.R.T. and W.I.P. When these are received we can invite membership from other countries and really get to work!

(Members of W.I.A. may be interested to know that JA1FG and JA1BK, who represented J.A.R.L. in Sydney, have made a personal gift of a Yaesu Museu FTDX400 Transceiver to the W.I.A. in appreciation of our hospitality in Sydney. This will be used by

Executive to keep skeds on the Federal Communication Nets and by the Secretariat on the weekly Region III. Division skeds.)

Last month, Federal Vice-President reported on the activities of Executive and those at the Wodonga meeting on translators. He went on to refer to the forthcoming space frequency conference. It will be remembered that in the past W.I.A. could be said to have been one of the few effective voices from Region III., but now, if the I.A.R.U. Region III. Division can be made into an effective body, we can draw together the combined strength of the Region, thus the Amateur voice can be that much stronger.

## DIRECTORS OF I.A.R.U. REGION 3 DIVISION



Top left (L-R): JA1FG, JA1BK, VK3KI, VK3TY.  
Bottom left (L-R): VK3VX, VK3OV, VK3OR, DUEA.

Top right: W0DX.  
Bottom right (L-R): VK3IZ, ZL3APC, ZL3AZ.







of course, some interaction between mike signal input strength, compressor and a.f. gain control setting, 100K ohm vox gain control (between 12AT7 and 6AL5), the 3 megohm time constant control, the anti trip level control and the relay valve bias, current level and relay sensitivity. The correct settings have to be found experimentally:

(a) Set valve bias (1K ohm) without speech or anti trip voltage so that the standby relay is only just still in receive position (resting). About 5-8 mA. go through this relay.

(b) Set compressor gain (1 megohm lin.) and modulation gain (50K ohm log) for the usual speech level to obtain sufficient and linear drive.

(c) Open up the vox control (100K ohm) and time constant control (3 megohm) to obtain fast enough and sufficient vox action, e.g. positive relay valve grid voltage compared with the cathode potential. Use S1 to operate the transmitter.

(d) Set anti trip level (100K ohm) so that sound from the speaker cannot trigger the relay and transmitter action.

ing voltage of four valves is then reduced when netting.)

(c) Grid 1 bias changed from a.l.c. to -50 volts blocking voltage, or the limited blocking voltage for netting.

(d) Controlling the antenna relay (98v. x 40 mA.) from the negative bias supply of the p.a., which also turns on/off the screen grid voltage of the p.a. valves to disable the linear amplifier in receive position under all conditions. This relay is a 220v. a.c. 27 mA. relay, but it caused too much buzzing noise when a.c. operated.

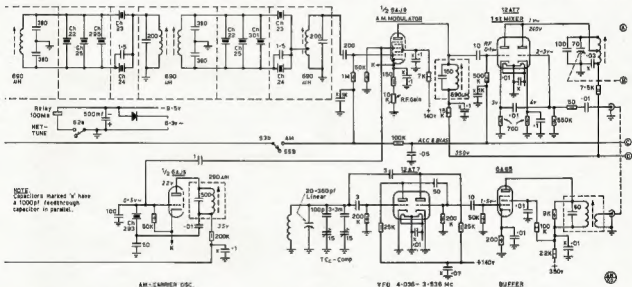
The relay must not click too loud when it falls back into the receiving position or this sound will turn the tx on via the vox system, and this on/off action repeats itself so that the tx is out of control.

Typical operating voltages are shown on the circuit diagram and the valve pin connection circles. This is extremely helpful if trouble shooting has to be done, because one can quickly see or measure how many volts the various points should have. These values are

identical forward resistance." You must be very lucky if this is all you have to know about the ring modulator to make it work correctly. The circuit first used was published by an Amateur magazine. It used a triode crystal carrier oscillator without buffer, link coupling from the plate tuned circuit, 5v. r.f. r.m.s. to the ring modulator balancing resistor, putting 3.5 volts on the diodes. Many other circuits found in the literature did not mention the recommended r.f. voltage the diodes should obtain.

The higher the r.f. level at the ring modulator (with carrier effectively cancelled out), the less amplification is needed in the following stages, which means less instability difficulties, less hum and better carrier suppression. One may assume that Ge diodes with 100 volt inverse voltage are safe at the 3 to 5 volt r.f. level. These diodes can often take 100 mA. pulse current, so my diodes looked okay.

The ohm meter test to select matched groups of diodes is extremely crude, measuring with a high resistance volt-



Too much anti trip voltage makes it impossible for vox to turn the transmitter on, unless the op. shouts too loud, which may cause distortions. Switch S1 off.

(e) Manual rx-tx operation: Turn vox control low and use standby switch S1.

A stiff regulated B+ source had to be used for the plate supply of the relay valve with the current going through the 5,000 ohm relay winding, or the relay used did not obtain sufficient power (80v. x 6 + 10 mA.) to operate all contacts in a reliable manner. A more sensitive relay would be desirable.

Standby relay contacts:

(a) B+ on/off in receiver affecting r.f. stages and mixer but not the oscillators.

(b) A.f. input on/off to ring modulator, to prevent modulating the exciter when netting. (The exciter grid block-

ing voltage of four valves is then reduced when netting.)

## RING MODULATOR AND CARRIER OSCILLATOR

We can find quite a number of different balanced modulators in the literature. I chose the ring modulator (diode quartet) because commercial communications apparatus used and still use this method very successfully. The apparent simplicity seems the reason why the Amateur literature brings out very little about the finer points of this circuit, and it was here that I struck serious difficulties (distortion) after checking a long list of possible other sources for the trouble. Stages were reconstructed and the circuit was many times modified.

The book says: "Select four diodes with the help of an ohm meter which have a high inverse resistance and

age source a non linear resistance, which is load and temperature sensitive, can be tricky. The only truly matched diodes can be found by testing the full dynamic voltage range, using the finally applied load resistance and current and the same temperature and frequency. This is easier said than done, because the load resistance for each diode is formed by the three other ring connected diodes, which are voltage, temperature and frequency (its capacity changes) dependent. Attached L, C and R add to the complexity.

After four diodes had been found which gave, under certain conditions, a good carrier cancellation of over 40 db., it was observed that the balancing potentiometer (100 ohm carbon moulded track) had to be reset after a few words had been spoken into the mike, or after the other carrier crystal had been switched in which gave a different r.f. output. New balance was only



obtained after the plate circuit of the carrier oscillator had been returned (this was the old circuit). The balancing trimmer had also to be reset. This made L.s.b. to u.s.b. changes rather complicated.

Using the XYLY hair dryer showed that the balance was temperature affected, and a thermistor was tried in one of the resistor lines to obtain automatic compensation. Using the EC211 frequency meter as a u.s.b. receiver revealed that the non linear and greatly fluctuating load (the diodes presented) caused f.m. of the 414 Kc. carrier crystal oscillator, which did not sound like s.s.b. Changing the carrier oscillator valve to pentode operation in an e.c.o. circuit with 330 ohm plate resistor (no more L and C circuit) and using a 1,000 pF. coupling capacitor to the ring modulator solved the f.m. problem and plate circuit tuning difficulty.

Care must be taken that the L.s.b. and u.s.b. crystals give the same r.f. voltage or the balancing is not identically good when switched from 80 mx L.s.b. to 20 mx u.s.b. operation.

Earlier an a.f. transformer (50:1) and r.f. chokes were used between the 6BA6 and the ring modulator. Matching difficulties were first suspected, but 100 c/s. hum pick up by the chokes and the transformer was identified as the trouble source. Every low a.f. input note gave two a.f. output signals behind the filter.

The reports on s.s.b. quality were still conflicting; some said it sounds okay, others said that the first CQ call or so was clear but later distortion developed. Some claimed that they could not resolve the signal at all (only local stations), etc. Listening to one's own transmission (speech) is misleading and a tape recorder becomes very useful to check what goes on.

None of the many helpful suggestions offered by friends proved to have hit the spot. Several other difficulties (some only occasionally) occurred in the following stages (later discussed) were eventually identified and cured, but the modulation was still no good. This transmitter had an unusual sickness, so it appeared. I mention this in detail, because it shows that copying a circuit without understanding it may sometimes not work at all. A discussion with a physicist, who had made good Ge diodes including those for ring modulators, did teach me that the smallest components are apparently the most complicated ones.

Soon after, on the first hot day (95° F.), followed a lengthy experiment, which heated the rig up (no cooling fan was installed at that time), a QSO was made, when it was observed that the output fell. More a.f. gain brought it back but only for a moment. The carrier became stronger, the gain fell back and distortions resulted. From these circumstances and meter readings, it became clear that the ring modulator diodes had packed up. As we often experience, extreme conditions revealed the trouble spot.

Diode data was now obtained, more informative than the few handbook values. A diode quartet was attached to a filament transformer with voltage taps and the current in the ring was

measured versus a.c. voltage across opposing ring positions.

| V. A.C. | mA. D.C. |
|---------|----------|
| 1       | 0.4      |
| 2       | 3.5      |
| 4.5     | 8        |
| 6.5     | 35       |

at 25°C.

It was now obvious that the safe current and power ratings of the diodes had been exceeded, especially at high operating temperatures.

The problems mentioned earlier were now quickly solved by installing Si diodes, which had very uniform characteristics, lower forward resistance and higher inverse resistance than the various types of Ge diodes tested so far. They can easily take the temperatures involved without runaway effects or derating. The carrier voltage across each diode was reduced to 0.5v. r.f. r.m.s. The carrier cancelling potentiometer (100 ohm) and trimmer (30 pF.) do no longer require re-adjustment and are not needed at the front panel.

The diodes for ring modulators must be dynamically matched. Suitable Ge

diodes are those for low impedance load (not the f.m. types). These diodes draw usually 15 mA. with 1v. d.c. The r.f. voltage has to be kept low if >25°C. (77°F.) ambient temperatures are used.

Published circuits which do not show all important voltage values are not very helpful to train Radio Amateurs.

## THE CRYSTAL FILTER

Following similar frequency steps as used by a well known U.S. manufacturer, I had decided to build a crystal filter at about 400 Kc. using surplus FT241 crystals. An excellent paper by DJ2KY\* described a simple method.

The accompanying table shows crystal channel numbers and frequencies. Within each bracket is a group of crystals with frequencies symmetrically spaced above and below the value of the centre crystal (channel number).

I used group No. 7 for my filter. Both filter sections use the same No. 23 and 24 bridge series crystals. The —6 db. filter bandwidth is about 50% wider than the oscillator frequency spacing of these crystals, which is just right.

\* "DL-QTC," August 1961.

## FT241 CRYSTALS—Channel Nos. 0 to 79 and 270 to 375

| Fund. Freq. Kc. | Channel No. | Fund. Freq. Kc. | Channel No. | Fund. Freq. Kc. | Channel No. |
|-----------------|-------------|-----------------|-------------|-----------------|-------------|
| 370.370         | 0           | 430.833         | 303         | 470.833         | 358         |
| 372.222         | 1           | 432.222         | 304         | 472.222         | 359         |
| 374.074         | 2           | 433.611         | 305         | 473.611         | 360         |
| 375.000         | 3           | 434.074         | 306         | 474.074         | 361         |
| 376.962         | 3           | 435.000         | 307         | 475.000         | 362         |
| 378.358         | 271         | 435.926         | 308         | 475.926         | 363         |
| 379.777         | 272         | 436.389         | 309         | 476.388         | 363         |
| 379.108         | 273         | 437.777         | 310         | 477.777         | 364         |
| 379.638         | 5           | 438.190         | 311         | 478.190         | 365         |
| 380.555         | 6           | 438.655         | 312         | 479.655         | 366         |
| 381.481         | 8           | 440.555         | 310         | 480.555         | 366         |
| 381.944         | 370         | 481.481         | 38          | 481.481         | 36          |
| 383.333         | 7           | 481.944         | 34          | 481.944         | 34          |
| 384.722         | 277         | 483.333         | 36          | 483.333         | 36          |
| 385.185         | 8           | 484.722         | 312         | 484.722         | 369         |
| 386.111         | 9           | 485.185         | 39          | 485.185         | 62          |
| 387.037         | 8           | 486.111         | 314         | 486.111         | 62          |
| 387.500         | 278         | 487.037         | 38          | 487.037         | 63          |
| 388.888         | 280         | 487.500         | 35          | 487.500         | 64          |
| 389.377         | 281         | 488.888         | 37          | 488.888         | 64          |
| 390.741         | 11          | 490.377         | 317         | 490.377         | 353         |
| 391.888         | 282         | 490.741         | 38          | 490.741         | 65          |
| 392.595         | 12          | 491.888         | 39          | 491.888         | 354         |
| 393.055         | 283         | 493.055         | 319         | 493.055         | 65          |
| 394.444         | 285         | 493.055         | 319         | 493.055         | 355         |
| 396.392         | 14          | 494.444         | 40          | 494.444         | 87          |
| 397.222         | 286         | 495.392         | 321         | 495.392         | 336         |
| 398.146         | 15          | 496.286         | 41          | 496.286         | 68          |
| 399.611         | 287         | 497.222         | 42          | 497.222         | 69          |
| 400.000         | 16          | 498.146         | 43          | 498.146         | 358         |
| 401.388         | 289         | 499.611         | 43          | 499.611         | 359         |
| 401.822         | 17          | 500.000         | 44          | 500.000         | 70          |
| 402.777         | 290         | 501.388         | 325         | 501.388         | 361         |
| 403.704         | 18          | 501.822         | 44          | 501.822         | 71          |
| 404.166         | 291         | 503.777         | 47          | 503.777         | 72          |
| 405.555         | 19          | 505.704         | 48          | 505.704         | 362         |
| 406.944         | 293         | 507.168         | 49          | 507.168         | 363         |
| 407.407         | 20          | 508.555         | 48          | 508.555         | 73          |
| 408.333         | 294         | 509.944         | 329         | 509.944         | 365         |
| 409.255         | 21          | 510.333         | 47          | 510.333         | 74          |
| 409.722         | 205         | 510.333         | 48          | 510.333         | 366         |
| 411.111         | 22          | 510.333         | 49          | 510.333         | 75          |
| 412.500         | 287         | 512.500         | 50          | 512.500         | 367         |
| 413.952         | 23          | 514.952         | 53          | 514.952         | 77          |
| 413.558         | 24          | 516.358         | 59          | 516.358         | 368         |
| 414.815         | 24          | 517.815         | 34          | 517.815         | 78          |
| 415.277         | 299         | 519.277         | 335         | 519.277         | 371         |
| 416.666         | 25          | 520.666         | 52          | 520.666         | 79          |
| 418.055         | 301         | 522.055         | 337         | 522.055         | 372         |
| 418.519         | 26          | 523.519         | 53          | 523.519         | 80          |
| 419.444         | 27          | 524.444         | 54          | 524.444         | 374         |
| 420.370         | 302         | 525.370         | 54          | 525.370         | 81          |



The shunt crystals, No. 22 and 25, again evenly spread from No. 298 (centre), are used in both sections to reduce the side lobe of the filter response curve, cutting -30 db. or even deeper notches in the lobes. The first filter section has a No. 295, and the second a No. 301 shunt crystal, sufficient to reduce the far off resonance side lobes. The 1.5 pF. parallel capacitors attached to the No. 24 crystals allow a compromise between steep slope or less side lobes.

The filter response curve shows that this filter is as good as required and as good as the best we can find in Amateur equipment. The shielding between filter sections and input to output circuit has to be extremely good.

The crystal frequencies finally used (see Table 1) differ slightly because most of these crystals saw service in exotic areas and some have corroded electrode to wire solder connections, which are difficult to repair. Each crystal holder has to be opened and checked, or the filter will never or only intermittently work. Additional crystals were obtained via the extremely helpful VK2AVA, and grinding a corner of the crystal brought them to the desired spot frequency.

| Channel No. | Measured Kc.     |
|-------------|------------------|
| 295         | 409.720          |
| 2 x 22      | 411.240, 411.180 |
| 297         | 412.590 Carrier  |
| 2 x 23      | 413.212, 413.190 |
| 298         | 413.705 Centre   |
| 2 x 24      | 414.736, 414.856 |
| 299         | 415.495 Carrier  |
| 2 x 25      | 416.740, 416.835 |
| 301         | 418.060          |

Table 1.

## FILTER TESTING

(a) The g.d.o. was equipped with a coil and parallel capacitors to cover the range 414  $\pm$  5 Kc., using a large 0-100° knob. This range was carefully calibrated with the BC211 frequency meter. The g.d.o. feeds into the input coil of the filter, the other coil end is earthed. A v.t.v.m. measures the output at the plate of the 6AJ8 heptode following the filter. Check coil tuning at the centre frequency. Check slope and side lobe attenuation. The slugs of the tuned circuits at the grid and plate of the 6AJ8 valve have to be carefully adjusted to obtain a flat top curve, or the audio response of the l.s.b. and u.s.b. will not be identical and flat.

(b) Plug No. 298 crystal in carrier oscillator, switch S2 to "netting", measure drive with exciter r.f. output voltmeter (included), peak all six 414 Kc. filter coils.

(c) Connect an audio signal generator to the microphone jack, switch s.s.b. carrier on, measure r.f. output at the exciter, replace driver pi output capacity (from p.a. valves) with a 60 pF. capacitor (a 1:4 cap. voltage divider

may be needed, if a Ge diode r.f. probe v.t.v.m. is used). Check driver r.f. output versus a.f. input.

It may have been noticed that the carrier frequencies are further away from the original No. 297 and No. 299 crystal frequencies. This was necessary to avoid too much bass (from the op's voice and dynamic mike) from passing the filter.

This effective way of audio response shaping has the advantage of further suppressing the carrier and unwanted sideband. The excellent filter shape factor of 1:158  $\Delta f$  (-60 db.)  $\div$   $\Delta f$  (-6 db.) = 1.68 allowed a carrier suppression of >40 db. on the filter slope alone. Adjusting the carrier frequency can have remarkable results as far as voice intelligibility is concerned. The smaller the bandwidth (less treble) the less bass must be used too. Here again the tape recorder is very helpful for comparing the operator's voice:

- Recorded with hi-fi mike.
- Recorded with DX mike, or what have you.
- Recorded with a.f. taken from behind each a.f. stage.
- Recorded and received voice taken after each r.f. and mixer stage and from the p.a. operating the linear final into a dummy load.

## THE A.M. MIXER (MODULATOR)

The 6AJ8 valve following the crystal filter has a dual function.

S.S.B.: Amplifying the s.s.b. signal to the maximum level the first mixer can handle, because high gain is easier obtained at 414 Kc. with 2.5 Kc. bandwidth than at 28 Mc. with 500 Kc. bandwidth. Usually only 10% of the gain of this stage is needed.

A.M.: The oscillator B+ and the a.f. is switched (S3a/b) to this 6AJ8 valve. The triode works as a.m. carrier oscillator valve and a fraction of a volt controls grid 3 of the heptode section. A.f. voltage from a separate volume control (200K ohm log.) reaches via switch S3b grid 1 of the heptode. The a.m. carrier can be keyed for c.w. operation or to test the final with max. drive.

The valve holders of valves carrying r.f. voltage are all mounted on top of the chassis, standing on their centre shield, and the "no r.f." carrying contact lugs are soldered to 1,000 pF. feed-through capacitors to simply shielding and to keep all r.f. out of the below chassis space. Capacitors marked with X are in parallel to these feed-through capacitors.

## FIRST MIXER AND V.F.O.

The left triode of the 12AT7 mixer valve is the actual mixer with cathode injection of the oscillator (v.f.o.) voltage. The other triode has grid injection of the same oscillator voltage, causing similar but out of phase plate current as far as the v.f.o. signal is concerned, which therefore largely cancel out in the plate circuit, forming a balanced mixer. The stage gain of ten is halved by the double tuned 50 Kc. wide band-pass circuit.

It is very interesting to check with an absorption wave meter how well unwanted mixing products and the carrier are suppressed, because the

following fixed tuned and damped wide band circuits are far less discriminating. Tapping the mixer plate half way down the coil helped too. The ganged air capacitor tunes from 4.450 to 3.850 Mc. with a 90° rotation. The v.f.o. voltage is 20 times or more the s.s.b. mixer input signal, which helps to reduce mixer distortion.

The desirable features of the Franklin oscillator are well known. The air capacitor used (20 years old) has a frequency linear cut rotor (if a special parallel C is used) which, in combination of the right coil and worm reduction gear drive (ex U.S. surplus) and a 0 to 500 counting dial knob, was so adjusted that the numbers represent the kilocycle to be added to the lower band edge, e.g. direct digital frequency read out. Considerable patience is required to get this feature right.



VFO (chassis open). The special stator cut of the air capacitor, to achieve frequency linear tuning, is visible. Rotor and stator are machined from a block and have quartz insulation. The worm gear drive has split gears, spring loaded. The coil wire is glued to the ceramic former. Half the chassis is free for the separate c.o. of the tx.

Differential  $\pm$  temperature drift compensation is included which maintains the total capacity but allows to increase or reduce the effect of a 20 pF. N3300 (TC) or a 100 pF. P100 (TC) ceramic capacitor. The 15 pF. trimmers are very stable miniature air capacitors. All other capacitors near the tuned circuit are NPO ceramic types. To reduce the overall drift, no magnetic core was used in the coil.

This v.f.o. is many times more stable than the one in the BC221 frequency meter. A buffer stage with the 6AG5 valve follows. The buffer output is matched with a link coil to the two feet long co-axial cable and mixer resistance. The output voltage lies between 2 and 3v., which is about right for the typical 12AT7 mixer circuit. The v.f.o. frequency range is 4.036 to 3.536 Mc.

Earlier an unexpected beat note and signal was observed. It was found that the balancing triode of the mixer started to oscillate (tuned grid-tuned plate) using the buffer plate circuit as grid tuned circuit. The 50 ohm grid stopper prevented the trouble finally. This sort of experience may be the reason why the industry so often uses a cathode follower as buffer today.

(To be continued)



# REMEMBRANCE DAY CONTEST RESULTS

## TASMANIA WINS R.D.

Congratulations to VK7 for their well deserved win. They had the highest participation, highest ever top-six log average, and the highest State score since VK5 won with 5707 in 1964.

An analysis of the last eight years' top logs shows that 1968, under the present scoring table, proved to be the best year, with all States' top logs scoring over 1,200 points. VK7DK's tally of 1822 points for 18½ hours of operating could stand as a record for some time.

Band conditions were most favourable with many logs showing numerous 10 metre contacts. S.s.b. usage also was noticeably predominate, and, because of it, the bands appeared able to cope with the station pile-ups that occurred without the mutual interference known of old.

Once again congratulations to Tasmania for a fine effort and we hope that next year all States will put up a good fight, trying to win.

—Neil Penfold, F.C.M. for F.C.C.

[See Analysis of R.D. Results after Listeners' results.—Ed.]

### DETAILS OF STATE SCORES

|     | Log | Licence | Entry | Participation | % Average | Top Six | Total State Points | State Score |
|-----|-----|---------|-------|---------------|-----------|---------|--------------------|-------------|
| VK2 | 72  | 1,742   | 4.1   | 1,114         | 21,497    | 1,998   |                    |             |
| VK3 | 60  | 1,702   | 3.5   | 1,041         | 20,889    | 1,771   |                    |             |
| VK4 | 60  | 861     | 9.0   | 1,102         | 18,548    | 1,771   |                    |             |
| VK5 | 85  | 720     | 11.3  | 1,132         | 19,251    | 5,375   |                    |             |
| VK6 | 83  | 424     | 19.6  | 1,115         | 18,809    | 4,785   |                    |             |
| VK7 | 85  | 217     | 30.0  | 1,294         | 13,577    | 5,367   |                    |             |

### STATE TROPHY WINNER

TASMANIA

### NEW SOUTH WALES

(Award Winners in Bold Type)

|       | Log  | Licence | Entry | Participation | % Average | Top Six | Total State Points | State Score |
|-------|------|---------|-------|---------------|-----------|---------|--------------------|-------------|
| VK1YN | 1301 | 1301    | 1301  | 1301          | 1301      | 1301    | 1301               | 1301        |
| VK2   | 1301 | 1301    | 1301  | 1301          | 1301      | 1301    | 1301               | 1301        |
| VK3   | 1301 | 1301    | 1301  | 1301          | 1301      | 1301    | 1301               | 1301        |
| VK4   | 1301 | 1301    | 1301  | 1301          | 1301      | 1301    | 1301               | 1301        |
| VK5   | 1301 | 1301    | 1301  | 1301          | 1301      | 1301    | 1301               | 1301        |
| VK6   | 1301 | 1301    | 1301  | 1301          | 1301      | 1301    | 1301               | 1301        |
| VK7   | 1301 | 1301    | 1301  | 1301          | 1301      | 1301    | 1301               | 1301        |

### Phone—

|       |      |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|------|
| VK1YN | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK2   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK3   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK4   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK5   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK6   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK7   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |

### C.W.—

|       |      |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|------|
| VK1YN | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK2   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK3   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK4   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK5   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK6   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |
| VK7   | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 | 1301 |

### Open—

|      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|
| VK2B | 1227 | 1227 | 1227 | 1227 | 1227 | 1227 | 1227 | 1227 |
| 3DO  | 1181 | 1181 | 1181 | 1181 | 1181 | 1181 | 1181 | 1181 |
| 2BPC | 887  | 887  | 887  | 887  | 887  | 887  | 887  | 887  |
| 2RB  | 488  | 488  | 488  | 488  | 488  | 488  | 488  | 488  |
| 3CK  | 443  | 443  | 443  | 443  | 443  | 443  | 443  | 443  |

### VICTORIA

### Phone—

|       |      |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|------|
| VK3VE | 1291 | 1291 | 1291 | 1291 | 1291 | 1291 | 1291 | 1291 |
| 3WV   | 1068 | 1068 | 1068 | 1068 | 1068 | 1068 | 1068 | 1068 |
| 3AKD  | 1020 | 1020 | 1020 | 1020 | 1020 | 1020 | 1020 | 1020 |
| 3ADW  | 1015 | 1015 | 1015 | 1015 | 1015 | 1015 | 1015 | 1015 |
| 3SM   | 811  | 811  | 811  | 811  | 811  | 811  | 811  | 811  |
| 3ACW  | 791  | 791  | 791  | 791  | 791  | 791  | 791  | 791  |
| 3RV   | 704  | 704  | 704  | 704  | 704  | 704  | 704  | 704  |
| 3OM   | 601  | 601  | 601  | 601  | 601  | 601  | 601  | 601  |
| 3YQ   | 598  | 598  | 598  | 598  | 598  | 598  | 598  | 598  |
| 3DC   | 518  | 518  | 518  | 518  | 518  | 518  | 518  | 518  |
| 3YC   | 488  | 488  | 488  | 488  | 488  | 488  | 488  | 488  |
| 3AMK  | 479  | 479  | 479  | 479  | 479  | 479  | 479  | 479  |
| 7DJ/2 | 443  | 443  | 443  | 443  | 443  | 443  | 443  | 443  |
| 3ATM  | 394  | 394  | 394  | 394  | 394  | 394  | 394  | 394  |
| 3XY   | 371  | 371  | 371  | 371  | 371  | 371  | 371  | 371  |
| 3AR   | 340  | 340  | 340  | 340  | 340  | 340  | 340  | 340  |
| 3ARM  | 328  | 328  | 328  | 328  | 328  | 328  | 328  | 328  |
| 3EG   | 320  | 320  | 320  | 320  | 320  | 320  | 320  | 320  |
| 3EF   | 287  | 287  | 287  | 287  | 287  | 287  | 287  | 287  |
| 3ALN  | 275  | 275  | 275  | 275  | 275  | 275  | 275  | 275  |
| 3ASQ  | 273  | 273  | 273  | 273  | 273  | 273  | 273  | 273  |
| 3MH   | 243  | 243  | 243  | 243  | 243  | 243  | 243  | 243  |

### C.W.—

|        |     |     |     |     |     |     |     |     |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|
| VK3APJ | 658 | 658 | 658 | 658 | 658 | 658 | 658 | 658 |
| 3OP    | 654 | 654 | 654 | 654 | 654 | 654 | 654 | 654 |
| 3QK    | 401 | 401 | 401 | 401 | 401 | 401 | 401 | 401 |
| 3ARR   | 386 | 386 | 386 | 386 | 386 | 386 | 386 | 386 |
| 3APN   | 331 | 331 | 331 | 331 | 331 | 331 | 331 | 331 |

### Open—

|          |      |      |      |      |      |      |      |      |
|----------|------|------|------|------|------|------|------|------|
| VK3ASW/P | 1043 | 1043 | 1043 | 1043 | 1043 | 1043 | 1043 | 1043 |
| 3AKS     | 734  | 734  | 734  | 734  | 734  | 734  | 734  | 734  |
| 3QV      | 548  | 548  | 548  | 548  | 548  | 548  | 548  | 548  |

### QUEENSLAND

### Phone—

|       |      |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|------|
| VK4AW | 1159 | 1159 | 1159 | 1159 | 1159 | 1159 | 1159 | 1159 |
| 4GL   | 855  | 855  | 855  | 855  | 855  | 855  | 855  | 855  |
| 4CP   | 863  | 863  | 863  | 863  | 863  | 863  | 863  | 863  |
| 4LT   | 861  | 861  | 861  | 861  | 861  | 861  | 861  | 861  |
| 4XY   | 863  | 863  | 863  | 863  | 863  | 863  | 863  | 863  |
| 4BQ   | 743  | 743  | 743  | 743  | 743  | 743  | 743  | 743  |
| 4UA   | 701  | 701  | 701  | 701  | 701  | 701  | 701  | 701  |
| 4TZ   | 686  | 686  | 686  | 686  | 686  | 686  | 686  | 686  |
| 4DO   | 645  | 645  | 645  | 645  | 645  | 645  | 645  | 645  |
| 4LE   | 643  | 643  | 643  | 643  | 643  | 643  | 643  | 643  |
| 4LV   | 625  | 625  | 625  | 625  | 625  | 625  | 625  | 625  |
| 4LJ   | 583  | 583  | 583  | 583  | 583  | 583  | 583  | 583  |
| 4XZ   | 541  | 541  | 541  | 541  | 541  | 541  | 541  | 541  |
| 4W    | 525  | 525  | 525  | 525  | 525  | 525  | 525  | 525  |
| 4UW   | 517  | 517  | 517  | 517  | 517  | 517  | 517  | 517  |
| 4ZT   | 513  | 513  | 513  | 513  | 513  | 513  | 513  | 513  |
| 4FN   | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  |
| 4X    | 285  | 285  | 285  | 285  | 285  | 285  | 285  | 285  |
| 4XR   | 170  | 170  | 170  | 170  | 170  | 170  | 170  | 170  |
| 4NB   | 159  | 159  | 159  | 159  | 159  | 159  | 159  | 159  |
| 4HS   | 137  | 137  | 137  | 137  | 137  | 137  | 137  | 137  |
| 4CZ   | 113  | 113  | 113  | 113  | 113  | 113  | 113  | 113  |
| 4LN   | 108  | 108  | 108  | 108  | 108  | 108  | 108  | 108  |
| 4X    | 109  | 109  | 109  | 109  | 109  | 109  | 109  | 109  |
| 4HW   | 88   | 88   | 88   | 88   | 88   | 88   | 88   | 88   |
| 4AV   | 83   | 83   | 83   | 83   | 83   | 83   | 83   | 83   |
| 4QW   | 83   | 83   | 83   | 83   | 83   | 83   | 83   | 83   |
| 4AVT  | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   |
| 4PJ   | 80   | 80   | 80   | 80   | 80   | 80   | 80   | 80   |
| 4K    | 71   | 71   | 71   | 71   | 71   | 71   | 71   | 71   |
| 4ZCT  | 68   | 68   | 68   | 68   | 68   | 68   | 68   | 68   |
| 4SL   | 68   | 68   | 68   | 68   | 68   | 68   | 68   | 68   |
| 4KP   | 68   | 68   | 68   | 68   | 68   | 68   | 68   | 68   |

### C.W.—

|       |     |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| VK4XW | 367 | 367 | 367 | 367 | 367 | 367 | 367 | 367 |
| 4UC   | 354 | 354 | 354 | 354 | 354 | 354 | 354 | 354 |
| 4ES   | 190 | 190 | 190 | 190 | 190 | 190 | 190 | 190 |
| 4XP   | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 |
| 4SK   | 96  | 96  | 96  | 96  | 96  | 96  | 96  | 96  |

### Open—

|       |      |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|------|
| VK4HR | 1395 | 1395 | 1395 | 1395 | 1395 | 1395 | 1395 | 1395 |
| 4PX   | 1095 | 1095 | 1095 | 1095 | 1095 | 1095 | 1095 | 1095 |
| 4CK   | 309  | 309  | 309  | 309  | 309  | 309  | 309  | 309  |

### SOUTH AUSTRALIA

### Phone—

|       |      |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|------|
| VK5PO | 1338 | 1338 | 1338 | 1338 | 1338 | 1338 | 1338 | 1338 |
| 5PT   | 1287 | 1287 | 1287 | 1287 | 1287 | 1287 | 1287 | 1287 |
| 5ST   | 1031 | 1031 | 1031 | 1031 | 1031 | 1031 | 1031 | 1031 |
| 5QX   | 819  | 819  | 819  | 819  | 819  | 819  | 819  | 819  |
| 5EP   | 688  | 688  | 688  | 688  | 688  | 688  | 688  | 688  |
| 5WC   | 637  | 637  | 637  | 637  | 637  | 637  | 637  | 637  |
| 5CK   | 523  | 523  | 523  | 523  | 523  | 523  | 523  | 523  |
| 5TG   | 460  | 460  | 460  | 460  | 460  | 460  | 460  | 460  |
| 5TY   | 468  | 468  | 468  | 468  | 468  | 468  | 468  | 468  |
| 5VM   | 440  | 440  | 440  | 440  | 440  | 440  | 440  | 440  |
| 5OH   | 388  | 388  | 388  | 388  | 388  | 388  | 388  | 388  |
| 5HM   | 354  | 354  | 354  | 354  | 354  | 354  | 354  | 354  |
| 5PL   | 338  | 338  | 338  | 338  | 338  | 338  | 338  | 338  |
| 5GX   | 317  | 317  | 317  | 317  | 317  | 317  | 317  | 317  |
| 5JC   | 301  | 301  | 301  | 301  | 301  | 301  | 301  | 301  |
| 5WG   | 280  | 280  | 280  | 280  | 280  | 280  | 280  | 280  |
| 5LC   | 265  | 265  | 265  | 265  | 265  | 265  | 265  | 265  |
| 5ZZ/T | 247  | 247  | 247  | 247  | 247  | 247  | 247  | 247  |
| 5GN   | 204  | 204  | 204  | 204  | 204  | 204  | 204  | 204  |
| 5NH   | 198  | 198  | 198  | 198  | 198  | 198  | 198  | 198  |
| 5D    | 184  | 184  | 184  | 184  | 184  | 184  | 184  | 184  |
| 5DE   | 149  | 149  | 149  | 149  | 149  | 149  | 149  | 149  |
| 5BB   | 138  | 138  | 138  | 138  | 138  | 138  | 138  | 138  |
| 5UA   | 138  | 138  | 138  | 138  | 138  | 138  | 138  | 138  |
| 5C    | 124  | 124  | 124  | 124  | 124  | 124  | 124  | 124  |
| 5CR   | 123  | 123  | 123  | 123  | 123  | 123  | 123  | 123  |
| 5ST   | 109  | 109  | 109  | 109  | 109  | 109  | 109  | 109  |
| 5BV   | 107  | 107  | 107  | 107  | 107  | 107  | 107  | 107  |
| 5WN   | 96   | 96   | 96   | 96   | 96   | 96   | 96   | 96   |
| 5ON   | 85   | 85   | 85   | 85   | 85   | 85   | 85   | 85   |

### C.W.—



# TASMANIA

## Phone—

|        |      |      |       |    |      |
|--------|------|------|-------|----|------|
| VKTWH  | 3678 | Pta. | VKTZL | 29 | Pta. |
| 7TX    | 1254 |      | 7ZLH  | 26 |      |
| 7MD    | 871  |      | 7ZJG  | 24 |      |
| 7PA    | 559  |      | 7ZBJ  | 23 |      |
| 7LS    | 555  |      | 7ZAS  | 23 |      |
| 7SS/P  | 508  |      | 7EB   | 22 |      |
| 462    | 462  |      | 7BQ   | 22 |      |
| 324    | 324  |      | 7DA   | 21 |      |
| 7VF    | 347  |      | 7ZRV  | 19 |      |
| 7SF    | 300  |      | 7CB   | 19 |      |
| 7RM    | 180  |      | 7ZOR  | 18 |      |
| 7AB    | 148  |      | 7ZCP  | 17 |      |
| 7FP    | 136  |      | 7JP   | 16 |      |
| 7MX    | 106  |      | 7KR   | 15 |      |
| 7LZ    | 82   |      | 7MR   | 14 |      |
| 7LD    | 81   |      | 7WC   | 14 |      |
| 7PJ    | 69   |      | 7JD   | 13 |      |
| 7IL    | 59   |      | 7ZCW  | 13 |      |
| 7KX    | 57   |      | 7DR   | 11 |      |
| 7CK    | 48   |      | 7NZ   | 10 |      |
| 7PM    | 46   |      | 7TT   | 9  |      |
| 7ZKJ   | 38   |      | 7ZWK  | 9  |      |
| 7ZRO/P | 35   |      | 7ZAK  | 7  |      |
| 7FS    | 35   |      | 7ZRJ  | 7  |      |
| 7ZFL   | 30   |      | 7ZKT  | 6  |      |

## C.W.—

|              |      |      |       |    |      |
|--------------|------|------|-------|----|------|
| VKTZL        | 518  | Pta. | VKTOM | 57 | Pta. |
| 7LJ          | 316  |      |       |    |      |
| <b>Open—</b> |      |      |       |    |      |
| VKIDK        | 1822 | Pta. | VKTZX | 85 | Pta. |
| 7EM          | 1374 |      | 7B    | 80 |      |
| 7Z           | 767  |      | 7SJ   | 43 |      |
| 7AL          | 307  |      | 7JB   | 43 |      |
| 7NC          | 286  |      | 7CS   | 43 |      |
| 7BY          | 97   |      | 7EW   | 53 |      |

## VKs 1, 8, 9, 0

## Phone—

|       |      |      |      |     |      |
|-------|------|------|------|-----|------|
| VKIJG | 692  | Pta. | VKAL | 104 | Pta. |
| 8DI   | 595  |      | 8VK  | 72  |      |
| 9WD   | 1201 |      |      |     |      |

## C.W.—

|              |      |      |       |      |      |
|--------------|------|------|-------|------|------|
| VKARA        | 276  | Pta. |       |      |      |
| <b>Open—</b> |      |      |       |      |      |
| VKAKK        | 1167 | Pta. | VKBDI | 1121 | Pta. |

# LISTENERS' SECTION

## New South Wales

| Points         | Points |
|----------------|--------|
| P. Gedge       | 1418   |
| J. M. Hillard  | 850    |
| P. Lineley     | 783    |
| F. McGrath     | 533    |
| N. Jays        | 307    |
| R. B. Mcintosh | 281    |
| D. W. Shephard | 259    |
| D. Grantley    | 235    |

## Victoria

|               |      |
|---------------|------|
| R. Treanym    | 3215 |
| A. Cox        | 3064 |
| G. Armstrong  | 759  |
| C. Constable  | 673  |
| R. Hand       | 602  |
| M. G. White   | 561  |
| T. Hambling   | 361  |
| E. Trebilcock | 335  |
| L. Milne      | 336  |

## Queensland

|                  |     |
|------------------|-----|
| K. D. Cunningham | 584 |
|------------------|-----|

## South Australia

| Points          | Points |
|-----------------|--------|
| S. Kneedger     | 1848   |
| P. Field        | 332    |
| P. W. Earl      | 336    |
| C. H. Hannaford | 346    |
| J. Crawford     | 343    |
| L. Lindsay      | 143    |
| R. Edmeades     | 143    |

## Western Australia

|               |      |
|---------------|------|
| P. W. Drew    | 1808 |
| P. L. Jackson | 1413 |
| K. Woodley    | 692  |
| I. P. Lockley | 379  |

## Tasmania

|                |      |
|----------------|------|
| B. Livingstone | 1478 |
| J. Everett     | 1030 |
| B. Mutton      | 954  |
| A. Dixon       | 558  |
| R. Stewart     | 578  |

# ANALYSIS OF R.D. RESULTS

## Top Six Logs for 1968

| VK3RG | 1227 | Points | 396 | Contacts |
|-------|------|--------|-----|----------|
| 3VK   | 1251 |        | 477 |          |
| 4RH   | 1208 |        | 465 |          |
| 3FO   | 1350 |        | 497 |          |
| 8RU   | 1051 |        | 608 |          |
| 7DR   | 1022 |        | 608 |          |

## Top Log Scoring

| 1966       | 1967       | 1968       |
|------------|------------|------------|
| VKJAH/1011 | VKJAH/1215 | VKJAH/1215 |
| 3APJ/971   | 3ALZ/974   | 3ALZ/973   |
| 4UX/988    | 4DP/919    | 4RH/756    |
| 5NO/1227   | 5NO/1230   | 5MS/1236   |
| 6RU/1105   | 6RU/963    | 6RU/959    |
| 7RX/971    | 7MS/977    | 7MS/735    |
| 1963       | 1964       | 1965       |
| VKJAH/1908 | VKJAH/1008 | VKJAH/1116 |
| 3ALZ/725   | 3MO/965    | 3MO/1063   |
| 4DJ/778    | 4RN/920    | 4RN/1091   |
| 5ZP/1440   | 5ZP/1370   | 5ZP/1370   |
| 6CL/807    | 6CL/807    | 6RY/759    |
| 7AL/657    | 7MS/465    | 7DR/935    |

| 1968       | 1967       | 1966       |
|------------|------------|------------|
| VKJAH/1304 | VKJAH/1037 | VKJAH/1227 |
| 3MO/1272   | 3MO/1241   | 3VK/1251   |
| 4RH/1208   | 4RH/1238   | 4UH/1236   |
| 5EF/916    | 5NY/1112   | 8FO/1256   |
| 6RU/1130   | 6RU/1130   | 6RY/1261   |
| 7SM/1230   | 7SM/1254   | 7DK/1222   |

## Total Log Entries

|      |     |      |     |      |     |
|------|-----|------|-----|------|-----|
| 1960 | 432 | 1963 | 483 | 1966 | 476 |
| 1961 | 405 | 1964 | 473 | 1967 | 435 |
| 1962 | 463 | 1965 | 418 | 1968 | 435 |

## Total Licenses used in Scoring

|      |      |      |      |      |      |
|------|------|------|------|------|------|
| 1960 | 3983 | 1963 | 4214 | 1966 | 370  |
| 1961 | 4086 | 1964 | 3285 | 1967 | 3377 |
| 1962 | 4141 | 1965 | 3765 | 1968 | 3468 |



# ERRATA

Readers are asked to note the following corrections to "A Table Top S.B. Transceiver for Six Metres," Sept., 1968, "A.R."—

1. Coupling capacitor between plate of V9 and grid of V10 omitted. Its value is 220 pF.
2. The 20 pF. drift adjust capacitor is a N750 not NFO.
3. The 0.001 uF. capacitor from the a.c. line to earth should be 0.1 uF.
4. The 6BE6 mixer screen resistor should be 25K 1w.

# W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

## PHONES

|        |         |       |         |
|--------|---------|-------|---------|
| VKMS   | 315/238 | VKASB | 286/314 |
| VKSAHO | 312/255 | VKAFJ | 282/201 |
| VKARIT | 307/232 | VKATY | 275/278 |
| VKSMK  | 304/233 | VK3TL | 271/277 |
| VKJZJ  | 303/230 | VK3AK | 266/273 |
| VKAHR  | 303/231 | VK4KS | 254/279 |

## New Members:

|           |    |       |         |
|-----------|----|-------|---------|
| Call. No. | 88 | VK3WJ | 153/154 |
| " "       | 89 | VK3OR | 102/103 |
| " "       | 90 | VK1VP | 115/115 |

## Amendments:

|       |         |       |         |
|-------|---------|-------|---------|
| VK4DO | 205/217 | VK4PX | 172/173 |
| VK3ZE | 194/197 | VK4UC | 107/107 |

## C.W.

|        |         |        |         |
|--------|---------|--------|---------|
| VK3QL  | 300/232 | VK4YL  | 266/283 |
| VK3AQH | 292/206 | VK3ARX | 262/280 |
| VK3CX  | 289/213 | VK4RU  | 260/280 |
| VK4FJ  | 288/213 | VK3NC  | 254/280 |
| VK3AQH | 282/256 | VK4CB  | 253/277 |
| VKAHR  | 270/259 | VK3APK | 250/268 |

## Amendments:

|       |         |       |         |
|-------|---------|-------|---------|
| VK3TL | 203/200 | VK4KS | 121/127 |
| VK4UC | 107/106 | VK4PX | 101/105 |

## OPEN

|        |         |        |         |
|--------|---------|--------|---------|
| VK3AQH | 311/331 | VK4TY  | 301/315 |
| VKAHR  | 309/333 | VK4FJ  | 296/320 |
| VK4RU  | 308/324 | VK3ARX | 288/288 |
| VK3MK  | 305/324 | VK3TL  | 287/283 |
| VK3VN  | 304/321 | VK3XB  | 286/274 |
| VK3EO  | 302/320 | VK3APK | 282/282 |

## New Member:

|               |        |         |
|---------------|--------|---------|
| Call. No. 113 | VK3AMK | 120/120 |
|---------------|--------|---------|

## Amendments:

|       |         |       |         |
|-------|---------|-------|---------|
| VK4KS | 272/291 | VK4UC | 202/203 |
| VK4DO | 238/246 | VK4PX | 194/196 |

D.X.C.C. members will notice that nearly all scores have been amended this month. Please refer to this month's Federal Awards Notes for information relating to additions and deletions.

# \*AEGIS

\*Registered Trade Mark

# INSTRUMENT KNOBS

Just 4 of our wide range of bakelite and metal knobs



MV3/R

Black with silver insert, brass bush bored for 1/4" shaft and 2 grub screws at 90°. 1 1/2" diam. x 1 1/2" high.

Available everywhere. Write for detailed, illustrated leaflet and prices



NK 1/2

Metal knob, silver, knurled black ring and black vertical lines. 2 grub screws at 90°. 1 1/2" diam. x 1 1/2" high.



NK 1/4



Metal knob, silver, silver knurled ring and black vertical lines. One grub screw at 90°. 1 1/2" diam. x 1 1/2" high.

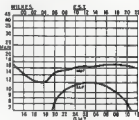
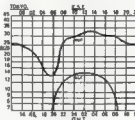
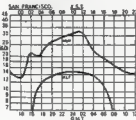
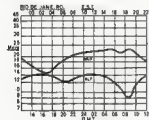
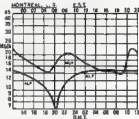
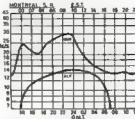
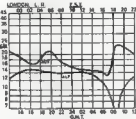
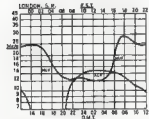
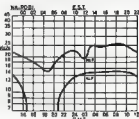
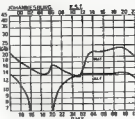
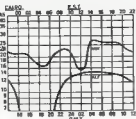
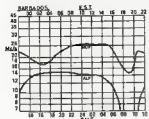
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Other features which can be added (and some are incorporated in the finished design) are rx a.g.c., tx a.l.c., S meter, external v.f.o., external crystal lock, rx calibrator or a.m. noise limiter. A good simple noise limiter has not yet been found by the writers.

Thus the total design makes it possible to start with a simple basic receiver, get it going on one band and add modules as time and money permit to expand, first to a multiband receiver and then to a multiband transceiver.

It is further possible to use the modules to "tailor" a specific requirement. For example, by using a simple crystal oscillator in place of the injection chain (12, 13, 14) one could produce a single fixed frequency receiver, or transmitter, or transceiver for W.I.C.E.N. or other net use. Provision has been made for such external injection as well as for a second v.f.o. to permit split frequency working.

Table 1 shows some of the possibilities inherent in the modular approach by listing various "end products" and the functions necessary to achieve them. The table is by no means complete and (within reason) the number of possibilities is limited only by the imagination. The writers will be pleased to talk over other possible combinations with anyone interested.

## FEATURES

### Frequency ranges:

- (i) 1.8 to 2.3 Mc.
- (ii) 3.5 to 4.0 Mc.
- (iii) 7.0 to 7.5 Mc.
- (iv) 14.0 to 14.5 Mc.
- (v) Provision made for optional addition of 21.0-21.5, 28.5-29.0 Mc. or any other two 0.5 Mc. bands.

I.f. Frequency: 9.0 Mc.

V.f.o. range: 5.0 to 5.5 Mc.  
Tuning: 0.5 Mc. per band. All bands tune in the same direction at the same rate.

Generator type: Filter uses a Pye 9-0A crystal filter.

Tx output: 15 watts p.e.p. into 50 ohms.  
Sideband selection: Automatic. Other sideband selectable.

Power supply: 12v. d.c. (or 230v. a.c. with suitable power pack)

Rx audio output: 1.5 watts into 8 ohms.  
Rx sensitivity: Better than 0.5 microvolts, 30% a.m. modulated.

Rx noise figure: Better than 3 db. at a bandwidth of 2.8 Kc.  
Drift: Better than 50 cycles per hour.

Other features:

- (i) Provision for external v.f.o.
- (ii) Provision for crystal lock.
- (iii) A.m. noise limiter.
- (iv) Uses Eddystone dial but will accept less exotic ones.
- (v) Rx vernier tuning.

### End Product

### Function Used

|                                |  |
|--------------------------------|--|
| Four-band receiver             | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14      |
| 3.5 Mc. receiver               | 1, 2, 13, 3, 4, 5, 7, 8, 9                     |
| 3.5 Mc. transmitter/receiver   | 1, 2, 3, 4, 5, 8, 9, 7, 13, 15, 16, 17, 19, 20 |
| 3.5/14 Mc. transmitter         | 15, 16, 7, 3, 4, 17, 13, 19, 20                |
| Spot frequency receiver        | 1, 2, 14, 3, 4, 5, 7, 8, 9, 10                 |
| "Front end" for an existing rx | 1, 2, 12, 13, 14                               |
| 9 Mc. s.s.b. generator         | 13, 16, 7, 3, 4                                |
| QRP c.w. transmitter (v.f.o.)  | 12, 13, 14, 17, 19 (+ 20)                      |
| "Q5er" back end                | 5, 6, 8  |
| A.m. modulator pre-amp.        | 15   |

Table 1.—Function Combinations.

The grouping of functions on to printed circuit boards is as follows:

- (a) Rx r.f. amplifiers and mixers—Functions 1, 2.
- (b) 9 Mc. filter unit—Function 3.
- (c) Rx i.f. amplifier and a.g.c.—Functions 4, 9.
- (d) A.m. detector, a.m. N/L, prod. detector—Functions 5, 6.
- (e) Rx audio, squelch, C/O relay—Function 8.
- (f) V.f.o. (in die cast metal box)—Function 13.
- (g) Injection oscillators and mixers—Functions 12, 14.
- (h) Tx audio—Function 15.
- (i) B.f.o./balanced modulator—Functions 7, 16.
- (j) Tx mixers, pre-amplifiers and a.l.c.—Functions 17, 19.
- (k) Tx p.a.—Function 20.
- (l) Rx crystal calibrator—Function 11.

Having covered the general concept of the design, and shown some of the possibilities inherent in it, the description will now become more specific. Comments in all cases refer to the completed unit.

With the exception of the v.f.o. and tx p.a., all printed circuit boards are 4½" x 2½" and use a glass epoxy substrate. ½" is left uncut at each end for mounting purposes.

The completed unit is contained in a metal cabinet approximately 15" x 8" x 11" deep. If sufficient interest is shown, consideration will be given to organising a supply of the metalwork.

Wide use has been made in the circuitry of Motorola MPF102 single gate FETs and R.C.A. 3N140 dual gate FETs. These are obtainable from Cannon Electric and Radio Parts respectively.

Other transistors used are either Mullard or Fairchild. All other components are standard items and can be obtained in Australia.

The specification of an output power of 15 watts peak may cause some comment. It is certainly worthy of some. In Australia, although sideband transmitters are rated on output, there are still a very large number of Amateurs who still use the older d.c. input terminology. The reasons for this are understandable since most of the commercial equipment sold in this country

is of either American or Japanese origin. Both of these countries use a d.c. input method of rating sideband transmitters and the specifications (and advertising) refer only to d.c. input. Depending on the particular mode of operation, in which the p.a. is run, the peak output of commercial gear may be as low as 30% of the d.c. input. Thus a transmitter rated at 100 watts peak d.c. input may well only give 30-35 watts of peak r.f. at the antenna.

Thus the 15 watts peak output capability of the present design is not insignificant and is about half the power one would get from valve equipment using a single tube in the p.a.

It is certainly possible to get more than 15 watts from a single transistor, but for multiband operation (as distinct from single spot frequency operation) the problems of matching a transistor output impedance of a quarter ohm or so into a 50 ohm antenna are rather frightening. An attempt to work out the circuit constants (and switching) for a four-band h.f. rig giving 50 watts of output and running off a 12 volt rail will soon indicate the size of the problem.

The 15 watts output level was finally chosen because—

- (a) It simplifies matching problems.
- (b) It is quite adequate for "barefoot" operation.
- (c) It is more than sufficient to drive an AB or ABE valve linear to the full allowance of 400 watts peak output.
- (d) It allows safe operation of the p.a. transistor even with the antenna disconnected.
- (e) It can readily be obtained from available transistors off a 12 volt rail.
- (f) It is—in general—compatible with the concept of portable equipment.

## DESCRIPTION OF MODULES

### Receiver Audio Module

(Function 8, Fig. 1)

The audio end of any transistorised equipment is—on the face of it—the simplest.

However, quite a number of circuits were tried before settling for that shown in Fig. 2. This circuit is essentially the one described in the Fairchild Applications Brief No. A002, the only additions being the transistor associated with the base circuit of the AY1121 driver. Full acknowledgment is made to Fairchild for the use of this circuit.

Under quiescent conditions the emitters of the output pair are held at approximately half rail potential. On positive excursions of the input signal the AY6108 conducts and drives the speaker through the 250 µF. capacitor. The AY6109 drives it on negative excursions. At very small signal levels an appreciable portion of the power delivered to the load passes through the 580 ohm resistor. The AY1120 and AY1121 form a high gain direct coupled voltage amplifier to drive the output pair. 100% feedback through the 2.2K resistor accurately establishes the quiescent point of the output pair.

The 470 ohm resistor between the AY6108/AY6109 emitters and ground reduces cross over distortion at low



signal levels, while the 150 ohm resistor in the AY1121 emitter/ground path establishes the sensitivity of the unit.

The 0.1  $\mu$ F condenser across the supply rails prevents oscillation if the impedance of the supply is excessively high (e.g. dud batteries).

The unit can be operated at rail voltages of between 9 and 20 volts without modification although of course the power output will also vary.

At 12 volts and using an 8 ohm speaker load, the output is 1.3 watts for an input voltage swing of 1.0 volt peak to peak. No heat sinking is required

for the output pair under these conditions, but if the rail voltage is raised to 20 volts to take advantage of the 3.5 watts of output, then available heat sinks are necessary.

The transistor in the base circuit of the AY1121 is an optional feature. It is used in the completed unit as a muting switch.

### 9 Mc. Filter Module (Function 3, Fig. 1)

The performance of the Pye 9-0A crystal filter is—for its price—the best obtainable on the Australian market. Other 9 Mc. filters are obtainable which

have marginally better performance, but they are usually much more expensive and, being imported, are subject to supply variations. Accordingly, the decision was made to use a 9 Mc. i.f./s.s.b. generator system which used the Pye 9-0A.

Fig. 3 gives the circuit diagram and, with one small exception, is as recommended by Pye for use with their filter.

The exception is the use of fixed capacitors of 120 pF. and 100 pF. at the input and output of the filter instead of the part fixed/part variable capacity recommended by Pye. There was no discernable difference in the performance of the unit due to this change.

The input amplifier (BF115) gives some gain but its main purpose is to match the input to the 150 ohms presented by the filter. The output transistor (also a BF115) is used as an emitter follower to give the board a low output impedance. The RFC and associated 0.01  $\mu$ F. capacitors in the +12 volt line are to prevent coupling between input and output via the feed line. No adjustments of any sort are called for and, providing the components are mounted correctly, it will work first time.

### Tx Audio Module (Function 15, Fig. 1)

This module includes not only the voltage amplification required but also incorporates pre-set automatic audio level control. To a certain extent this latter feature achieves the same end as the more conventional r.f. derived a.l.c. Fig. 1 indicates that provision has been made for both forms in the overall design. Fig. 4 gives the circuit diagram.

A two-stage RC coupled pre-amplifier using Motorola MPF102s takes input from a 50 ohm dynamic microphone. The amplified signal is fed to gate 1 of an R.C.A. 3N140 dual gate FET. Output from the 3N140 is again amplified in a third MPF102 whose output is split two ways. One output goes to the balanced modulator (to be described) while the second output is again amplified and then rectified to give a control voltage which is applied to gate 2 of the 3N140.

The only critical adjustment on the board is the 1.8K resistor in the drain of the 3N140 and the value of this resistor may have to be adjusted in extreme cases.

The value of 1.8K shown has proved satisfactory on four developmental models. When the correct value is used for the drain resistor of the 3N140 the drain voltage under no signal conditions should be 4 volts. This voltage should rise to 8 volts at maximum speech input. At average input levels the voltage should be around 6 volts.

The 20K audio level control is mounted external to the board and connecting pins are provided on the board to make the necessary lead anchor points. These pins also provide connecting points if an external microphone pre-amplifier (mounted in the microphone case) is used. It is the writers' opinion that such a case mounted pre-amplifier is most preferable to prevent r.f. getting into the audio system. However, in this

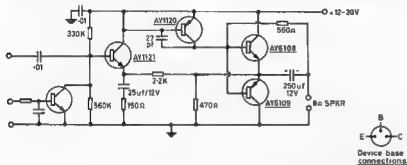


FIG. 2 - 4-BAND TRANSISTOR TRANSCEIVER - AUDIO SECTION-RECEIVER.

NOTE: The 0.1  $\mu$ F. capacitor across the supply rail in Fig. 2 should read 0.1  $\mu$ F.

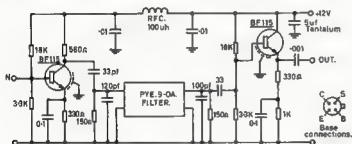


FIG. 3 - 4-BAND TRANSISTOR TRANSCEIVER - FILTER SECTION.

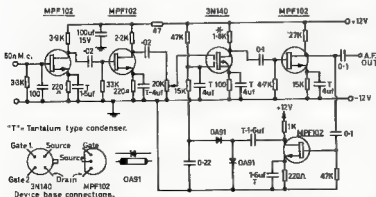


FIG. 4 - 4-BAND TRANSISTOR TRANSCEIVER - TX AUDIO SECTION.



design lack of knowledge of the type of microphone that would be used prevented this being done. For those who wish to fit a pre-amplifier in the microphone case the circuitry of the first two stages in Fig. 4 are perfectly applicable.

Two pairs of connecting pins are provided on the p.c.b. as anchor points for p.t.t. connections.

#### AVAILABILITY

As for all the designs published in "A.R." over the past two years, provision is being made to make available full kits of parts, printed circuit boards or p.c.b.'s plus full instructions and diagrams.

Twelve or so boards are involved and in the case of the finished job the same board has been used several times. A four-band transceiver for example uses 21 boards in all.

The aim has been to keep the average cost of each board to around \$12-\$15 but of course this must vary from module to module according to its complexity.

The receiver audio kit will cost \$12 less speaker.

The transmitter audio kit will cost \$25 complete.

The filter kit will cost \$30 complete.

All of the above prices include all components, p.c.b., diagrams and instructions.

P.c.b.'s alone will be \$2 each, while P.c.b.'s plus diagrams and instructions will be \$3.

Anyone interested in taking part in this project is invited to write to one of the writers—3AFQ—at 4 Elizabeth St., East Brighton, Vic., 3187, for additional information on supplies of kits or p.c.b.'s.

(To be continued)

## Magazine Review

### "BREAK IN"—JUNE 1968

**A Double Sideband Transmitter:** Five band d.s.b. rig beginning with a Franklin v.f.o. and having a pair of 8DQ6s in the final. Uses disposals parts and tubes readily available in Australia.

**Oscilloscope Notes:** Information on using the VCR97 disposals c.r.t. in a simple oscilloscope suitable for checking a.s.b. transmitters, etc.

**The Minicheck:** A small device which turns an ohmmeter into a transistor checker and permits lead identification, etc.

**Integrated Circuits:** General dissertation on purpose and manufacture of these devices and the promise they hold out for more sophisticated and less expensive consumer products.

**B/C Converter for 80 Metre Transceivers:** Describes a simple transistor converter to enable broadcast stations to be received on an 80 metre transceiver.

### "BREAK IN"—JULY 1968

**Four-Band S.b. Transmitter:** A phasing rig beginning with 9 Mc. generator and followed by the usual stages to a T721 final, uses many disposals components and readily available tubes, etc. For a power input of around 150 watts d.c. peak. The unit has built-in v.o.x. and a.l.c. all in one cabinet.

**Hertz Cycles and Seconds:** Describes the origin of the term "Hertz" for "cycles per second" and explains the relationships between frequency and time and the different time scales in use throughout the world. A good article of general interest without diagrams.

**The Lazy L.A.D.S.:** A design for a light actuated dip switch. Simple circuitry using three transistors and an L.D.R.

**Wind Speed Indicator, from parts around the Shack:** Short article describing how ZLIIM built himself a wind-speed indicator from a small permag. motor and a multimeter.

### "BREAK IN"—AUGUST 1968

**Grinding and Etching Crystals:** Cliff Dixon, ZL2FT, and P. J. Rogers, ZL-3NH. Two short articles, one on each of these subjects by the above authors, grouped by the editor to acquaint Amateurs with the crystal working process, by which crystals can be adjusted to frequency.

**An Eight-Valve QRP S.b. Transceiver:** From a lattice filter made from F7241 crystals operating in the normal I.F. range to a 6AG7 used as the transmitter final and receiver a.f. stage on 80 m.x. A small handy rig for car, field day or home QTH.

**Oscilloscope Notes, No. 2:** Continuing the article commenced in June "Break In".

**Effects of Stray Capacitance on L and C Measurements:** Explains how to make reasonably accurate measurements of L and C using simple equipment and how "strays" affect accuracy.

**Transistor Breadboard and Power Supply:** An experimenter's approach to solid state techniques.

**Linear Amp. for the D.s.b. Tx:** Describes a linear designed for the d.s.b. tx described in June "Break In" which increases the input power to about the N.Z. legal limit of 300w. d.c. peak using an 813 or a pair of TT21s. E.h.t. about 2,500v. for 813 and 1,100v. for TT21s.

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whether the two channels under question could be deleted from any motion.

VK3ZKD proposed that Channels (2) and (3) be not listed as immediate priority Channels, although he felt that the occasion would soon arise when they would be used.

Motion 13 was withdrawn and it was subsequently moved VK3TX, seconded VK3ZKD:

1.4. That the Primary Service Transmitter frequencies be 145.8 Mc input and 145.9 Mc output, and the second channel be 146.1 Mc input and 146.8 Mc output with the frequencies 146.1 Mc input and 146.7 Mc output, and 146.3 Mc input and 146.8 Mc output, reserved for future expansion, subject to national agreement of Service Transmitter facilities.—Carried unanimously.

It was also agreed that deviation would be compatible with existing facilities.

VK3ZKD raised the question of national coordination of a simplex channel. After little discussion, it was moved VK3ZKD, seconded VK3ZIM:

1.5. That the Primary Simplex Frequency be 146.5 Mc and that new operators be encouraged to commence on this frequency.—Carried unanimously.

1.6. Moved VK3AKK, seconded VK3ZBN: "That 43 Mc be accepted as a standard 5 m. net frequency."—Carried unanimously.

On the subject of Experimental Repeaters, VK3ZBN said that these can be set up by those who wish to do so, greater care being taken.

As the work involved is experimental, this precludes the use of commercial equipment. His proposed frequencies are 147.5 Mc input and 147.6 Mc output with deviation of plus or minus 15 Kc.

VK3ZKD thought that there would be problems with other transmitter channels.

1.7. Moved VK3AKK, seconded VK3ZBN: "That the frequencies of 146.7 Mc. in and 147.6 Mc. out, together with the frequencies of 420.35 Mc. in and 421.50 Mc. out with a deviation of plus or minus 15 Kc. be set aside for Experimental Transmitters on a national basis."—Carried unanimously.

Meeting then adjourned.

#### SUNDAY MORNING

The Chairman called for any further business and VK3ZKD suggested that it would be appropriate to consider a national net frequency for 8 metres.

1.8. Moved VK3AKK, seconded VK3ZKD: "That the national 8 metre f.m. net frequency shall be 32.525 Mc. though it is noted that it is not intended to preclude the use of 32.58 or 32.900 Mc. as alternative State channels."—Carried unanimously.

The following recommendations were also agreed to by the representatives:

1. Further discussions can be held on the taking of Interstate stations on 43 Mc. It will be desirable in the near future to suggest frequencies.

2. VK3ZKD suggested that it would be desirable to keep a national record of progress and problems during the establishment and running of these repeaters.

On the suggestion of VK3AKK, a sub-committee of all Divisional technical committees to assist with technical problems. VK3ZBN continued by stating that State groups set in an advisory capacity may liaise with the Department.

1.9. Moved VK3TX, seconded VK3ZBN: "That the VK3ZKD act as a Secretary for the co-ordination of v.h.f. net frequencies."—Carried unanimously.

VK3ZKD stated that his Division had asked that seven or eight channels be made available for interstate working but felt that the agreements reached would be satisfactory. However in the light of experience or necessity, he felt that it should be open for Divisional to submit plans to the VK3Z Secretariat. The meeting agreed that this was the case, and the Secretariat agreed to coordinate all aspects of the repeater installations. VK3ZKD asked that if and when State repeater committees are formed representation be allowed from country areas.

VK3TX, Federal Councillor, noted these remarks and stated that it was necessary that those people proposing to install a repeater should seek the guidance of their State committees. The matter would be discussed at State Council level.

The meeting also noted that where repeaters were proposed at State border areas, that the closest co-operation exist between the respective Divisions and technical committees and the Secretariat.

In conclusion the Chairman thanked all those present for making the effort to attend the meeting. The presence of VK3APQ, VK3TX and VK3TY as Divisional Federal Councillors was particularly valuable, as well as the technical representatives from Divisions.

He stated that apart from circulating these minutes to all Divisions, notification would be given to Divisional Councils on those matters which could well become Institute policy.

He also thanked the VK3Z Division for the comments which had been given due weight during the discussions and suggested that this Division write to VK3Z for clarification on any technical points.

VK3ZKD thanked the Chairman and Secretary for their work and was appreciative of the presence of Federal Executive on this occasion.

VK3ZBN, in his remarks, stated that he was very impressed with the calibre of the people present and felt that this augured well for future developments.

Finally, the Chairman thanked Arthur VK3SAUL for his work in organising accommodation and the dinner.

The meeting was officially closed at 1006 hours, Sunday, 22nd September, 1968.

## V.H.F. NOTES

Well it's news time again and still no reports from other States. If any Interstate correspondence have news for the Institute, send it to me before Thursday, 27th. I can include them on this page. January "A.R." notes should be in before 2nd Dec. And now some news on beacons.

VK3VF 144.800 Mc  
VK3VF-32.000 145.000 and 432.800 Mc  
VK3VF 144.800 Mc  
ZE13ZF-144.010 and 432.040 Mc, both with 100 watts input 15 db. gain antennas and operate continuously.

Do you know of any other v.h.f. beacons? If so, please let me have full details so as the details can be published in Dec. "A.R."

—T3, Cyril, VK3ZCK.

## VICTORIA

The VK3 V.h.f. Group held its Annual Convention in Bendigo over the week-end 12th and 13th Oct. We hope that all those who attended had a very enjoyable time. Thanks should go to the Bendigo group for their help and hard work that made the week-end successful.

6 Metres: Neville VK3ZPN and John VK3ZWL have been spending a large amount of their spare time during the winter months building tunable mobile transceivers for six metres, so that they can take their tx to any from the QTTI area and work the summer DX in peace. Robert VK3ZUE is active every week-end, a.m. with about 150 and a beam and a ground plane, while Geoff VK3AKM has appeared again after an absence of quite some time. Jim VK3ZHF, now back from C-land, is active again and is often heard on both the a.m. and f.m. nets. He can also be found lower down the band with ample power from an 8881.

Yours truly has arranged several skeeds with Ws and Ks for the coming season, while a W8 reports that he has a half mile long rhombic beamed on Sydney. He transmits at 9700 E.A.S.T. using c.w. and one kilowatt and then listens for any VK call. Dates, times and frequencies will be given in "A.R." and in the isdial broadcasts when they become available.

8 Metres: Activity is on the increase due to the presence of stations from central Victoria with VK3ZEP in Bendigo is being worked regularly by Melbourne stations, while Bill VK3AMZ has shown his high power s.b. rig which uses a 4CX50B and the full legal power. Bill has also been his beam as the previous one became unserviceable.

78 Centimetres: No reports have been received for this band and this can be rectified only by the regular operators sending in details.

An extra v.h.f. field day to those listed in last month's "A.R." has been announced for Easter Sunday, a field day but there will not be one over the New Year holiday period. Anyone in VK3 with news for this column should send it to Robert VK3AUR (Always UnReliable), c/o Vic. Div.

T3, Robert VK3AUR.

## W.I.A. V.H.F.C.C.

| New Members: |        | Confirmations  |
|--------------|--------|----------------|
| Cert. No.    | Call   | 52 Mc. 144 Mc. |
| 48           | VK3ABA | — 119          |
| 49           | VK3ABT | — 118          |
| 50           | VK3ABJ | — 110          |

| Amendments: |        | Confirmations  |
|-------------|--------|----------------|
| Cert. No.   | Call   | 52 Mc. 144 Mc. |
| 44          | VK3AMK | — 128          |
| 46          | VK3AMJ | — 136          |
| 47          | VK3ZNJ | — 236          |

## 160 Mx Transpacific Tests

The Trans-Pacific Tests which were so successful last season are to be repeated this summer, and dates and times are as follows.

| Saturday, 26th November 1330-1600z |   |
|------------------------------------|---|
| — 4th December                     | — |
| — 28th                             | — |
| — 11th January                     | — |
| — 1st February                     | — |
| — 15th                             | — |

Frequencies W/V West Coast 1975 3000 W/V East Coast 1800-1810  
JA 1807.5-1812.5  
TA 1870 1880

Call: CQ DX TEST in five-minute periods, listening between calls. W/Vs head off first period on the hour. All others head off on the next five-minute period. Keep to periods unless in QSO.

Special JA sunset tests will be held on the same dates, but at 0730 1000z.

January 25/26 will almost certainly be the date for the "CQ" W/W 150 Mx DX Contest, which has provided good openings in the past. More about this later. (Courtesy L6042)

## PROVISIONAL SUNSPOT NOS.

AUGUST 1968

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa

| Day | R   | Day | R   |
|-----|-----|-----|-----|
| 1   | 88  | 18  | 114 |
| 2   | 91  | 17  | 160 |
| 3   | 92  | 16  | 150 |
| 4   | 94  | 19  | 144 |
| 5   | 94  | 20  | 123 |
| 6   | 94  | 21  | 133 |
| 7   | 100 | 22  | 133 |
| 8   | 113 | 23  | 128 |
| 9   | 108 | 24  | 108 |
| 10  | 96  | 25  | 108 |
| 11  | 104 | 26  | 77  |
| 12  | 116 | 27  | 67  |
| 13  | 148 | 28  | 49  |
| 14  | 172 | 29  | 64  |
| 15  | 178 | 30  | 68  |
|     |     | 31  | 68  |

Mean equals 81.

Smoothed mean for Feb 1968: 103.

—Swiss Federal Observatory, Zurich.

## V.H.F. U.H.F.

Interested in what European Amateurs are accomplishing on these bands. Commencing January 1969, the authoritative German v.h.f. u.h.f. magazine UKW-Berichte will be published quarterly in English. 60 pages of the latest techniques, detailed construction articles on v.h.f. u.h.f. gear and antenna written by top Amateurs in Europe.

Annual subscription \$4.50 AIR MAILED direct from the German publishers. Send a cheque/money order to the Australasian representative of UKW Berichte, G. Clarke, VK-2ZXD, 2 Beaconview St., Balgowlah, N.S.W., 2093.

A LIMITED number of sample copies of the German edition are available free for inspection.







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- ★ USED BY SERVICES AND GOVT. DEPTS.

Formula III. Aerial Feeder compared with ribbon in db's per 100 ft., at 100 Mc.:

|                                      |      | WET | DRY |
|--------------------------------------|------|-----|-----|
| Formula III. Aerial Feeder . . . . . | 3000 | 1.2 | 0.4 |
| Flat Ribbon . . . . .                | 3000 | 7.6 | 1.5 |

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## Book Review

### MULLARD SEMICONDUCTOR INTERCHANGEABILITY LIST

This book is the successor to eight editions of the Mullard Transistor Interchangeability List. The title has been changed in keeping with its wider scope. The new issue has been enlarged to include, in addition to transistors, direct Mullard equivalents and comparable types for small signal diodes, zener diodes, rectifier diodes, thyristors and semiconductor photo-electric devices. The book, which contains 31 pages with over 4,000 entries, is available from Mullard-Australia Pty. Ltd., cover price \$1.

### NOTES ON SOLAR FLARE WARNINGS FOR SUPERSONIC TRANSPORT AIRCRAFT

This booklet makes available information about the aspects of the work of the Ionospheric Prediction Service Division, Bureau of Metrology, which may be of some interest, but would not normally be published in any scientific or technical journals. Apart from the introduction, the booklet contains five sections covering a summary of the problem, solar activity and proton flares, forecasting of solar events, existing warning systems and an outline of a possible warning system for supersonic transport aircraft.

Although not directly connected with Amateur Radio, the information is interesting, especially for anybody interested in radio astronomy.

★

### HINTS AND KINKS

#### TRANSCIVER RELAYS

Some transceiver owners have reported that replacement relays are difficult to obtain and are expensive.

Many imported transceivers use relays similar to the Siemens "Cradle" type. Relays for various coil voltages and up to four change-over sets are available from Siemens or Relays Pty. Ltd.

Associated Controls Pty. Ltd., Padstow, N.S.W., and their Victorian agents Eastern Instrument Pty. Ltd. in Melbourne can supply Allied or Varley relays with six sets of change-over contacts with heavy duty contacts for those critical positions.—VK3ASC.

★

### NOVEL MAINS TESTER

A pocket size neon lamp indicator suitable for testing a.c.-d.c. voltages from 100v. to 500v. is now available from Radio Parts Pty. Ltd., Melbourne.

Known as the Stuart brand, this handy tester has flexible leads with prods marked positive and negative (red-black), and is fitted with vest pocket clip. Insulated alligator clips can be supplied also to fit the prods. Trade price for neon tester: 60c each; insulated clips 10c each; 15% sales tax applicable.

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ALSO AMATEUR TYPE CRYSTALS—3.5 Mc. AND 7 Mc. BAND.

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## FEDERAL QSL BUREAU

Divisional QSL Managers are advised that there is no official Bureau for TRF Reunion hand and cards should be sent either direct to the station concerned or via R.F.Z.G. Paris. This information comes from FR7ZG.

Information on the DX Contest staged by I.A.R.U. Region 2 (America) on October 12 and 13 was received too late for prior publication. Anyone interested may obtain all information re scoring and logs from this Bureau.

Congratulations to Al Manwaring, VK2QK, of Coolumandura, on achieving CHC100 High Honors award. All CHC members will realise the ability and work involved in qualifying for this honor.

W3VVP, George Clough, of Cordova, Maryland, U.S.A., is desirous of arranging a s.a.b. card with a VK station over the U.S. Bureau. He is a friend, Sidney Dickson, is a competitor. Bid is the only U.S.A. participant in the event, the Australian section of which is due to leave Perth on Dec. 19 and to arrive in Sydney on Dec. 19. Your scribe has offered c.w. awards to W3VVP, but as he is a s.a.b. addict it is suggested that anyone willing to co-operate should contact George at Box 34, Route 1, Cordova, Maryland, 21625, U.S.A.

160KB, founder of CHC, advises of the 1st CHC International C.W. DX Contest scheduled for 0001Z Saturday, Dec. 7, to 2400Z, Sunday, Dec. 8. The contest open to all amateurs whether CHC members or not. The contest

is sponsored by the International C.W. CHC Chapter 73. All Amateur bands may be used and the usual six-figure exchange is employed commencing with BSR plus 001, etc. Awards are trophies for world highest, single operator, club station, and portable stations and certificates for the three highest scoring stations in each VK division. Printed lists regarding scoring, logs, etc., may be obtained from this Bureau.

Congratulations to the Victorian Division on the success of their recent unusual 100 metre contest. The provision of cross-mode and cross-band contacts made for a wealth of interest to all participants. A word of thanks is also due to the Interstate and 2L stations who contributed to the success by participating in the event.

—Ray Jones, VK3RJ, Manager.

## FEDERAL AWARDS

### AUSTRALIAN D.X.C. COUNTRIES LIST AMENDMENTS

**Deletions:**  
V500—Kurda Muria Is. Only contacts prior to 29/11/67 will be credited. From 30/11/67 V500 counts as MPNM—Mouset and Oman.  
ZCZ—Palestine. Only contacts prior to 2/7/68 will be credited.

**Additions:**  
Blenheim Reef, Geyser Reef. These two countries will be credited if contacts were after 4th May, 1967.  
Nelsons Is. will count as Chagos and is not a separate country. This also will be credited after 4th May, 1967.

Where cards for the above additional countries have been forwarded for credit prior to this time they have been noted. The countries have now been credited and members' totals amended accordingly. In the case of the deleted countries, all members who have claimed them have had their scores amended as necessary. Space does not allow a full list of all amendments.

### UNACCEPTABLE OPERATIONS FOR D.X.C.

QSLs from the following will not be credited for D.X.C.:—

KTLNU/MCSE—Ebon.  
KTLNU/TUC—Camaran.  
KILMP/KCA—Navassa.  
V2W2WV—Lacadeville.  
GQAA—A. Heard Is.  
PY0AA—St. Peter & St. Paul's Rocks.  
VK2ADY—A. Heard Is.  
JBNWV—Blenheim Reef.  
KGA—Geyser Reef.

### OVERSEAS AWARDS

The Federal Awards Manager advises members of the W that the following awards may be obtained without the necessity of forwarding cards overseas. Cards will, where necessary, be checked in VK. Application forms, rules, etc., may be obtained by forwarding a s.a.b.e. size 9 x 4 inches, to the Federal Awards Manager, W.I.A., Box 2611W, G.P.O., Melbourne, Vic. 3001.

"CQ" Awards—"CQ" magazine issues the following awards. Worked Prefixes—WPK; Worked All Zones—WAZ, S.S.B. DX Award.

J.A.R.L. Awards—AJF—All Japan Districts, WAZ—Worked All Japan Prefectures; JCC—Japan Century Clubs.

I.A.R.U. Award: WAC—Worked All Continents.

—Geoff Wilson, VK3AMK, Manager.

## Publications Committees Report

The Committee met on 7th October, when correspondence was received from VK5MY, VK3WA, VK5QX and VK3UG, the last two named also being technical articles, had VK3ASI. Official acknowledgments have been sent to these authors.

The Committee had hoped to review our financial position following the publication of the October issue, but this was not possible as printing and mailing accounts had not arrived, hence no decision could be reached regarding the size of the November issue. This will be decided before going to press.

Production of the QSL Book is progressing and by the time this appears in print the publication will be available from all the usual sources.

All the information sought by the sub-committee appointed at the last Federal Convention has been collated and passed to them, who understand the final report is now being completed ready for submission to the

Federal Councillors. The outcome of this report is eagerly awaited by the Committee, as the future of "A.R." depends very much on the results.

The Committee considered and reached final agreement on the form of the questionnaire which had been under consideration for several months. This questionnaire will be found in the centre pages of this issue and we request all readers to complete it and return it immediately.

## CONTEST CALENDAR

Until 1st Dec.: Contests Mexico 1968 (L.M.R.).  
R.2:1  
8th Nov. International OK DX Contest.  
9th/10th Nov.: 7 Mc. Phone Contest (R.S.G.B.).  
20th/21st Nov.: W. World Cup.  
7th Dec. 1968 to 12th Jan. 1969: Bass A. Mail V.H.F. Contest (V.I.A.).  
1st/2nd Feb. 1969, John Meyle Memorial National Field Day (V.I.A.).  
1st/2nd Feb. 1969: A.R.R.L. DX Test (phone section).

## HAMADS

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Advertisements under this heading will be accepted only from Amateurs and S.W.'s. The Publishers reserve the right to reject any advertising which in their opinion is of a commercial nature. Copy must be received at P.O. 36, East Melbourne, Vic. 3008, by 5th of the month and remittance must accompany the advertisement.

AVO Electronic Testmeter Mk. 4. Multimeter, V.I.M. and test meter all in one. Can be used up to 200 Mc. New price \$225, accept \$200, mt condition. Heathkit S.W.R. Bridge, \$20. 522 K and 230V power supply (heavy duty) to suit, \$30. VK3ASL, Phone 842-3514 (Melbourne).

COMPLETE S.S.B. Station, Galaxy III, Xtal Callibrator, Extensive V.F.O. Miles, Audio Compressor new P.A. Tubes, in mint condition. A.C. Power Supply, Ant. Transmatch with built-in 50 W.R. Bridge. Speaker, QZC, Cross Beam, Rotatable Mast, Drive Gear, Ant. Callibrator, S.S.B. o.n. VK3ON, 45 Pokina St., Eden Hills, S.A. 5150.

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FOR SALE: Amer can Perles Converter \$3 to 34 Mc. 30 Mc I.P., 8 amp. Novistor, noise figure 2.5 db, in-built power supply, 110V, 50/60 cycles, as new. \$30. Swinton, VK2AAK, Kulkura, N.S.W.

FOR SALE: Edgetone GC R, 400 Kc. to 30 Mc. 220V, 21F. Var Sel. I.P., etc. 1st class condition. \$295. QZ, Ham gear, 6-8 Command R, 400 Kc. to 30 Mc. 100 W. Novistor, 10W. Trans Modulator, 12V, 6.5/325V, d.c. converter, all cheap. Ring. Mels. 57-4220 for details

FOR SALE: Hallicrafter BK17 tripe conversion Receiver operates most freq from 85 Kc to 30 Mc. Crystal locked 1st and 3rd conversion oscillator, uses 100% S.W. sensitivity. Selectivity 500 c.p.s. 2.5 Kc and 5 Kc. prod. det. 11 no as limiter, 100 Kc xtal callibrator, variable T notch filter, ranges for 1.5-10, 2.5-4, 7-15, 16-14.5, 21-31, 28-50 Mc. Very low noise level, high sensitivity R in best condition used for DX and Amateur satellite work. \$380. Swinton, VK2AAK, Kulkura, N.S.W.

FOR SALE: Transceiver, Drake TR7 with a peak d.c. mobile pack, Webster a band whip, S.W.R. 1.5, 100 W. S. Wrigley, 161 Victoria St., Balmoral, Vic. 3350

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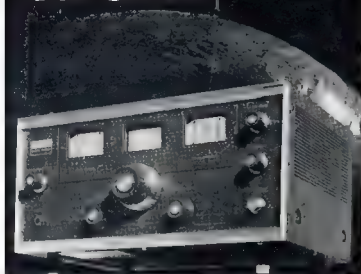
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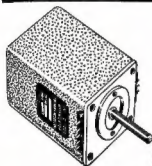
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The 'Trimax' Model G.45 Fader is a new design evolved from experience gained over twenty years of this type of manufacture, and features solid non-staining silver alloy contacts, floating rotor with three contact pressure points, optimum, permanently maintained contact pressure, rigid four pillar construction. Porous bronze main bearing, stainless steel spindle, high quality phenolic resin stud plates with acetal resin rotor bosses, diamond lapped contact surfaces, positive knob stop in addition to individual rotor stop, high stability resistors.



## L M ERICSSON PTY. LTD.

### "TRIMAX" DIVISION

FACTORY: Cnr. WILLIAM ST. & CHARLES ST., NORTH CROYDE, VICTORIA. PHONE: 22-1260... TELEGRAPHIC ADDRESS: "TRIMAX" MELB.



LM50



# A LARGE RANGE OF TRANSMITTERS, RECEIVERS, TEST GEAR, AND DISPOSALS RADIO PARTS AVAILABLE

## ● CRYSTAL CALIBRATOR No. 10

Nominal Frequency Range: 550 Kc. to 30 Mc.  
Internal 500 Kc. crystal. VFO frequency coverage: 250-500 Kc. 2 Kc. dial divisions.

Used (good condition): **\$10.50.**

New (sealed cartons): **\$13.00.**

Packing and freight: **\$1.50.**

## ● MILLER 8903B PRE-WIRED I.F. STRIPS

455 Kc. centre frequency, 55 db. gain. Employs two PNP transistors and diode detector.

Price **\$9.50.**

## ● EICO 753 TRI-BAND S.S.B. TRANSCEIVER

Full CW-AM-SSB coverage, 80-40-20 metres.  
180w. PEP SSB-CW. VOX-PTT-ALC. 10 Kc. Receiver offset tuning.

Kit **\$328.78**, Wired **\$428.78.**

### WANTED TO BUY

Communication Receivers, Test Equipment, etc. Call, write or phone. Equipment inspected and picked up at your convenience any night or week-end.

## ● VALVE SPECIALS

807—70 cents ea.

815—70 cents ea.

6AC7—20 cents ea. or 12 for \$2.

6J6—30 cents ea. or 7 for \$2.

6CQ6—20 cents ea. or 6 for \$1.

VR150/30—75 cents ea. or 3 for \$2.

VR105/30—75 cents ea. or 3 for \$2.

QB2/250 (813)—\$7 ea.

TZ40—75 cents ea.

6H6 (Metal)—20 cents ea.

DM71 (Indicator Tube)—40c ea. or 6 for \$2.

## ● TRANSISTORS

2SC73

2SD65

2T65

2T76

OC66

All at Bargain Price of **25 cents each.**

## ● STAR SR700 SSB AMATEUR BAND RECEIVER

Frequency coverage: 3.4-29.7 Mc. in 7 bands. Triple conversion, employs xtal locked 1st and 3rd conversion oscillators. Selectable USB or LSB. Selectivity variable, 0.5 Kc. to 4 Kc. 1 Kc. dial calibration. Three stages double locked geared dial mechanism, 30 Kc. per turn tuning rate. Vackar oscillator employed in VFO for maximum stability.

Price **\$461.50.**

## ● A111 9 Mc. SSB EXCITER

A fibre-glass printed circuit board, the finest German crystal filter, diode ring modulator, and solid state circuitry all contribute to make the A111 the finest SSB Exciter available. Specifications: Sideband suppression, 80 db.; carrier sup., 65 db.; audio freq. response, 350 to 3,000 cycles; mic. input, 1 mV. on 5K ohm load. Incorporates VOX amplifier and relay amplifier.

Price with KVG XF9B Filter, **\$120.**

## ● A112 5 Mc. VFO

Frequency coverage: 4950 to 5550 Kc. Frequency stability better than 100 c/s. over 12 hours long term; better than 8 c/s. over 10 minutes if enclosed in suitable box. Output: 350 mV. on 220 ohm load.

Price **\$22.**

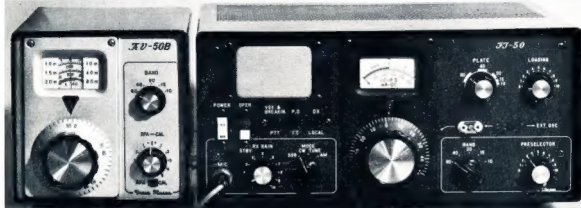
ALL ITEMS FREIGHT EXTRA

# UNITED TRADE SALES PTY. LTD.

280 LONSDALE ST., MELBOURNE, VIC. (Opp. Myers)

Phone 32-3815





## Yaesu FT-50 TRANSCEIVER

THE FT-50 IS A FIVE-BAND, 80-10M, SSB, CW, AM TRANSCEIVER, COMPLETE WITH BUILT-IN A.C. POWER SUPPLY AND PANEL-MOUNTED SPEAKER READY FOR DESK TOP OPERATION WHEN USED WITH EITHER HETERODYNE CRYSTALS IN THE VXO OR EXTERNAL VFO (FV-50B)

Basically a single conversion system utilising a five-crystal lattice filter (carrier crystal 5172.4 Kc.) with a 7360 balanced mixer, automatic sideband switching is accomplished. LSB on the 3.5 and 7 Mc. bands and USB on the 14, 21 and 28 Mc. bands. It follows that a minimum of spurious signals or image interference is produced. ALC minimises overdrive, helps develop extra "talk-power". Receiver incorporates prod. det. for SSB and CW, diodes for AM det. and AGC, high-gain 6B2 RF amp. Power supply full wave, solid state bridge rectifier, voltage regulated.

A panel switch enables selection of the built-in crystal heterodyning oscillator (VXO), tuned by varicap diodes; or the VFO (FV-50B) for full band coverage. The VFO includes the facility of "off-set" tuning, enabling a limited variation of receiver tuning, approximately  $\pm 5$  Kc., without altering transmitting frequency, very useful for net operation, etc. Crystals, optional extra.

In addition to PTT control, a VOX system is built-in; standard keying or break-in for CW. On CW, carrier frequency is automatically changed to allow it to enter filter pass-band.

To adapt the FT-50 for 12v. DC supply, for mobile or portable use, the DC-50 control unit is available. This accessory, designed to be fitted under a car dash, includes a speaker, volume control, microphone input, power switch and frequency control for the VXO, so that the FT-50 may be remotely controlled.

A fully calibrated meter provides accurate reading of PA cathode current, relative RF output, and receiver "S" units. Carrier insertion is adjustable, 0-maximum, for easy, safe tune-up. Balanced modulator is pre-set. No need to unbalance carrier for tuning. Transmitter PA tubes, a pair of 12BB14 high efficiency tetrodes. Includes antenna relay and robust SO-239 antenna socket.

VFO ranges: 3.5 Mc. band, 8,672.4 Kc. to 8,872.4 Kc.; 7 Mc. band, 12,172.4 Kc. to 12,322.4 Kc.; 14 Mc. band, 8,827.8 Kc. to 9,177.6 Kc.; 21 Mc. band, 15,827.6 Kc. to 16,277.6 Kc.; 28 Mc. band, 22,827.6 Kc. to 24,527.6 Kc.

### GENERAL SPECIFICATIONS:

Frequency ranges: 3.5-4.0, 7.0-7.5, 14.0-14.35, 21.0-21.5, 28.0-29.2 Mc.  
Power: 90 watts CW (SSB speech peak input 90-100 watt).  
Carrier suppression: At least 40 db.  
Sideband suppression: At least 40 db.  
Spurious radiations: Down at least 40 db.  
Antenna output impedance: 40 to 100 ohms unbalanced.  
Sensitivity: SSB, CW, better than 0.5  $\mu$ v. for 10 db. S plus N/N ratio:  
AM, better than 1  $\mu$ v. for 10 db. S plus N/N ratio.  
Selectivity: Plus or minus 2 Kc., -40 db.; plus or minus 1.2 Kc., -8 db.  
Receiver spurious response: Image rejection more than 50 db.; internal spurious signals within antenna bands less than that from a 1  $\mu$ v. antenna input.  
Audio output: 1 watt.  
Power source: AC—224v. 50 c/s.; Transmit 0.7a.; Receive 0.9a.; DC—12v., transmit 10a., Receive 6a.

Size: Height 6 in., width 13 in., depth 10 1/2 in.  
Weight: 22 lbs.  
Cabinet: Of sturdy construction, finished in satin black.  
Front Panel: Controls, etc.: Power, Oper./Stby., VDX/Bk-In./PTT, PQ/IC (meter), DX/Local (RF Gain Selector), Mic. Socket, VFO/VXO select, AF Gain, Mode, Band, VXO, Presselector, Plate Tuning, Loading.  
Rear: "S" Meter Zero, Bias, Carrier, VOX Sensitivity, Anti-Trip, Mic. Gain, Sockets for Key, VFO, Antenna, VFO power and remote. Fuse, earth Switch and socket for External Speaker.  
VFO: Transistorized FV-50B VFO employs easy to read gear driven dial with large heavy weight knob. Knob skirt, marked in 1 Kc. divisions (2 in. on 10 in.) is adjustable for calibration. In matching cabinet, 6 x 6 x 8 1/2 in. Wt. 7 lbs.

FT-50, complete with power cable, plugs, instruction book and circuits, and including FV-50B VFO, price only \$375.00, incl. S.T. 90-day warranty, after sales service.

FOR OUTSTANDING PERFORMANCE WITH ECONOMY—CHOOSE YAESU

We stock Yaesu spares, including all valves; PTT microphones, SWR Meters, Hy-Gain Antennas, etc.

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